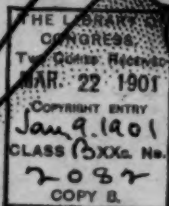


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# THE AUTOMOBILE MAGAZINE

FEBRUARY, 1901

SOME OF THE ARTICLES IN THIS ISSUE ARE :

The Automobile for the Physician,

*E. C. CHAMBERLIN, M. D.*

From Cleveland to New York,

*ALEXANDER WINTON.*

Dick Turpins Awheel, (Story) *PERCIE W. HART.*

Motor Vehicles in Business,

*W. H. MAXWELL., Jr.—HENRI G. CHATAIN.*

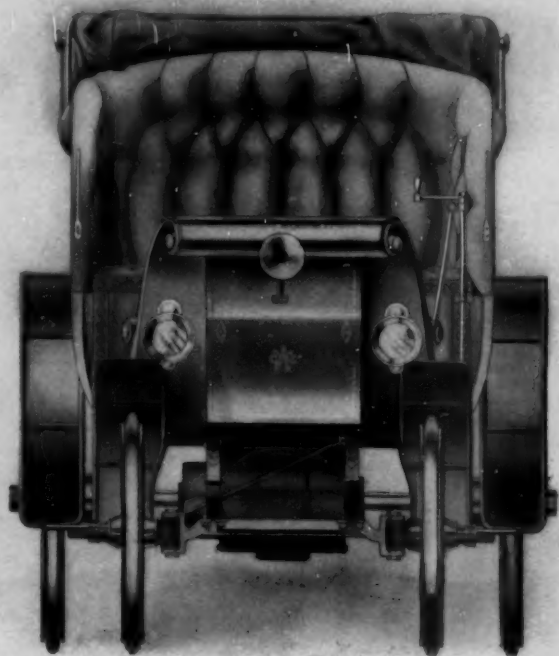
The Dream of the Scorcher (Poem).

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VOLUME III

NUMBER 2

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Messrs. Winton and Collings. (See From Cleveland to New York, page 121.)

# THE AUTOMOBILE MAGAZINE

VOL. III

FEBRUARY, 1901

No. 2

## The Automobile for the Physician

By EDWIN C. CHAMBERLIN, M. D.

**I**F there is any class of men who should deeply appreciate the advantages and comforts offered by the modern motor-car it must be the physician and surgeon. It has been the pleasure of the writer to frequently discuss this subject with many gentlemen who constitute this proportion of our population.

Among the charter members of the Automobile Club of America, and, in fact, at the first meeting of the organizers of this club no other profession was so well represented as the medical.

The practicing physician has peculiar needs, and in some respects he resembles the fire chief.

To be successful he must be ready at a moment's notice, and at all hours of the night or day to go a long or short distance, and the doctor who arrives promptly is the one selected for the second time, and is the one who has the ever-increasing practice. The ease, grace and swiftness of the automobile is such that it appeals with special force to the active practitioner, and to any one who wishes to keep abreast of the times and is anxious to actually save many hours during the week. The cost of a motor-car suitable for a physician being at the start the same as a pair of good horses with proper equipment and afterward maintained at a less expense, one can readily understand why this type of locomotion is pre-eminently suited to the physician.

The fact that an automobile can be kept standing and ready for instant use is a point greatly in its favor. With the best type of gasoline or electric vehicle the physician may be well started on his way to the patient, and flying along through the streets within thirty seconds

after receiving an emergency call. This element of constant readiness meets the need of any doctor, and will be appreciated more and more as the use becomes more general.

It is said that the automobile is the cause of new diseases affecting the chauffeur. They are called "eccentric motoritis" and "automobiliousness." This first disease attacks the enthusiast usually at the beginning of his career as a driver, but after learning all the ins and outs of his machine he becomes immune to further attacks. Automobiliousness, strange to say, affects the chauffeur when riding to make a record on long-distance club runs. With eyes set on some distant point he dashes along the highway, stopping only when a photographer appears or a reporter shakes his manuscript at him. It is a satisfaction to know that this form of disease also passes away after a few months' experience in the open air.

To enjoy all the solid and seductive comforts of the automobile the physician should be accompanied by a good mechanic, acting in the same capacity as coachman with a horse-drawn vehicle.

One doctor remarked the other day that he could cover 50 per cent. more ground with his automobile than formerly by horse power, and that he could now enter a house and not be annoyed by being obliged to stop and remove horse hairs from his clothes. Another physician told me he never suffered any more with cold hands, as he could always warm up over the motor during cold weather. Still another physician, a specialist on electricity, explained how he had used on several occasions his electric carriage batteries in taking X-ray photographs for use in surgical cases, when the electric current was not to be had. At fires, and other exciting points where the horseless ambulance is called, the surgeon and driver feel more secure and happy in the knowledge that the old ambulance horse, who frequently runs away, is safely home eating his oats.

In view of these, and many other features not mentioned, one is easily convinced that the horseless carriage is one of the greatest boons modern invention has given to the practicing physician.

---

A well-known engineer who has had some automobile experience and who is now a resident of Russia states that the roads generally in Russia are not at all well adapted to automoblling. All over Moscow there are nothing but cobblestones. He says the number of automobiles in St. Petersburg and Moscow is very small.

## What Shall be the Power?

**I**N a recent issue of the *Journal* of the Association of Engineering Societies, Louis Derr contributes an article in which he goes into a summary of the features of the various powers as applied to the propulsion of motor vehicles. He first takes up the electric motor, in which he treats of the advantages peculiar to their use. When he comes to the internal combustion engine he says that this type has not found extended favor in the country.

This statement would hardly seem to correspond with conditions as they actually exist. If one stops for a moment he will be surprised when he figures out the different styles of gasoline motors which are now on the market.

Regarding the use of compressed air for automobile service, the author says :

"Compressed air has been the engineer's dream ever since the invention of the steam engine, and many attempts—for the most part futile—have been made to apply it to vehicle propulsion. The chief trouble is from the inevitable refrigeration accompanying expansion, which, without reheating devices, quickly clogs the exhaust passages with frost ; but, even apart from this, the energy stored in compressed air is really comparatively small. It can be shown by a simple calculation that a pound of air, expanding isothermally from 150 pounds gage pressure to 15 (11 atmospheres to 2), will develop 48,300 foot pounds of work. Assuming that the steam carriage already described will develop  $2\frac{1}{2}$  horse-power hours before exhaustion of water supply, it follows that 103 pounds of air will be needed for the same endurance under the given conditions, which, by the way, are beyond the possibility of realization in practice. At the given pressure the air would occupy 122 cubic feet, and a tank nearly 5 feet cube would be needed. As this is out of the question, a much higher compression is used, and the customary pressure is 2,200 pounds or about 150 atmospheres. This reduces the volume to 9 cubic feet. Steel reservoirs to withstand this pressure weigh about 85 pounds per cubic foot of capacity. A weight of 66 pounds has been realized, but in this case the factor of safety is rather small, and explosion of a tank under this pressure is highly dangerous. Thus to contain the air 765 pounds of reservoir will be needed. To have 165 pounds pressure at the end of

the run another pound of air will be required, making a total of 869 pounds for reservoir and contents. This may be instructively compared with the 240 or 250 pounds required by the steam carriage for fuel, water and boiler. The weight of engines and piping is assumed to be the same in the two cases.

"In practice the case is not quite as favorable for the air engine. Available data indicate that, by using compounding, reheaters, etc.,—all adding weight and complication—about 0.27 of a horse-power hour can be obtained from a cubic foot of air at 2,000 pounds pressure. This weighs nearly 11 pounds, whence to get  $2\frac{1}{2}$  horse-power hours 118 pounds of air will be required. In the table below the available energy of compressed air expanding without loss under different pressure conditions is given for the sake of comparison with other sources of power."

He then goes on to speak of the ludicrous claims put forward for the energy available when liquid air is vaporized.

As to the question of cost of maintenance the author states "that this has not yet been definitely settled for American conditions. The following table is for a carriage belonging to a French physician, and covers an experience of 6,000 kilometers (about 4,000 miles). It undoubtedly represents a fair average cost. Although in this country the fuel and lubrication cost would probably be smaller, and the writer's experience would incline him to reverse the proportion of repair and depreciation charges, the greater cost of tires for American roads would probably keep the total about the same. Of course if the carriage is cared for by the owner the last item disappears:

Gasoline, . . . . .	2.00 cents per mile.
Oil and grease, . . . . .	0.15
Tires, . . . . .	0.94
Repairs and miscellaneous, . . . . .	5.05
Depreciation, . . . . .	3.09
Interest and taxes, . . . . .	1.09
Hostler, . . . . .	4.67
	—
	16.09

It is the author's opinion that, for urban-passenger service where charging stations are conveniently accessible, the electric vehicle will continue to hold its own. For heavy service he considers the steam carriage the best fitted, while for high speeds and long-distance work he considers the internal combustion motor the superior.

## Prudence's Automobile

You think me a man of some courage,  
So you've no idea how I feel  
When Prudence invites me out riding,  
With her in her automobile.

I accept with great trepidation!  
I don't like the looks of the gear;  
I'm shy of the whole apparatus,  
And then, Prue will ask me to "steer."

I hope that the tires will not puncture;  
I pray that this thing may not bolt;  
But I'd feel a hundred times safer  
Out driving an unbroken colt.

Seven miles inside twenty minutes!  
We swing round the corner on two wheels!  
Heav'n help us and all reckless mortals  
Who race in their automobiles!

I've longed to tell Prue that I love her;  
To beg her to hear my appeal;  
But I can't make love to advantage  
While racing an automobile.

I can't take my mind off the steering—  
Heav'n only knows where we should land!  
I dare not—though Prue is bewitching—  
Drive automobiles "with one hand."

NELLIE STUTSON CROFT.

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A certain well-known automobilist, who is the owner of a very fast machine, recently had occasion to travel from a Western town to New York and used his machine for the trip. He made a fast run, and had occasion to pass a field in which was one solitary cow. When the automobile hove in sight this cow became quite interested and gazed at the curious machine, apparently stunned at the sight. Our automobilist reached New York in blissful ignorance of the silent harm he had done. He returned to his Western home after completing his business in New York. A few weeks afterward he received a letter from a farmer in which a request was made for compensation, saying that since his cow had seen that automobile she had not given any milk. Automobilists, take note, and slow up in passing fields in which cows are grazing.

## The Roads of the World

BY L. LODIAN

**A**UTOMOBILES may be seen running over roads in Italy that were constructed more than 2,000 years ago—the self-same roads, hundreds of miles long, over which the Roman legions tramped flushed with victory, over which St. Paul walked, and over which the French troops so repeatedly marched in the early part of the century just passed. And through all those ages of centuries, the roads have scarce felt the touch of repair. In fact, most of them have never been repaired during 2,000 years of existence, simply because they have never needed repair. When the Romans built their splendid military roads, they built them on a sort of “self-repairing” principle; that is, they built them narrow enough to compel traffic to wear them down evenly.

For the—what seems to us moderns—narrowness of the old Roman roads has often been a matter of remark. The real object of this narrowness I have never yet seen stated in any exposition on road engineering, other than the idea being advanced of economy and rapidity of construction. But I learnt the real motive during travels in Italy in '91-'92.

We all know that a wide road is only too liable to be worn into ruts. The wider it is the more ruts it will degrade into unless sharply looked after. I have seen some natural-made roads in Cibiria (Siberia) one-quarter mile wide, but such a collection of ruts! On the other hand, during travels in Mexico Republic, I have seen narrow—say 12 feet—natural-made roads, running through a marshy country, almost as hard and compact and smooth as some of the asphalted streets of Manhattan city, or Paris or Berlin.

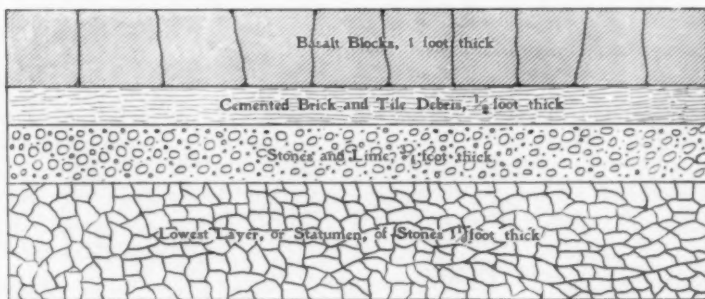
Those roads in Mexico, to which I refer, had on either side of them the quick-mud country. In popular language, this country is termed “quick-sands”; but—like a good many other things popular—this is erroneous. The earth is literally a quick-mud—a most tenacious clay—and sticks like glue to the clothing, if you happen to sink a foot into it, as did the writer. Among railroad engineers, this quick-mud is known as gypsum, and to handle the treacherous ground properly, has been a problem in track construction.

So, in Mexico, the traffic being forced to confine itself, in the

quick-mud country, to a 12-foot gage, has, in the course of years, hammered out a track as hard as a first-class French highway.

Now, the Romans built their 2,000-year-lasting highways purposely narrow, so that the roads should be "self-repairing," "self-mending," or "self-wearing-even," or what expression you like to apply to a road which automatically, so to speak, keeps itself in good order for a couple of millennia.

Since the old Romans never extended their conquests to America, we are not possessed of any remains of their roads, but the traveler in most parts of Europe will see them. You will even find them as far north as old Scotia—since the Republic extended its conquests even unto Caledonia. As most of the readers of this article have never seen a Roman road—much less noted the construction of one—I append herewith a sectional view, showing the successive layers :



*The Automobile Magazine*

Section of Roman Road Built 2,000 Years Ago. Still in Use

The Roman road, be it noted, is not a French road—nor a metal road, nor one of Macadam's, but (so far as the surface is concerned), a substantial solid stone or rock-wearing surface, made thicker and rendered more permanent than even the thickest flag-stone sidewalks in Europe or America ever were.

The loose stone underlayers rendered drainage excellent. Can it be wondered at that these ancient Roman highways are still to-day almost as perfect as two millennia ago? Just think of it—hundreds of miles are still in good order, without having, as before stated, felt the touch of repair. It is true that, during the lapse of ages, there have been wars galore, and that the rival parties have each had a hand in tearing up the roads for the sake of securing the big stones for the

erection of forts, temporary or permanent. This accounts for the peculiar sudden ending of some of the old military roads in Italy, which the tourist will notice to-day. He may follow one of these rock-stone highways till it suddenly "runs to seed" in a corn field or smiling vine-valley. He may be informed that, if he likes to trudge across five or six miles of cross-country land under cultivation, he will pick up the stone highway again. The interegnum space of road has been torn up (nobody knows when) for the construction of forts or houses. Even the peasants used to tear up the roads, for the sake of the flag-stones, when they wanted materials for their houses or mills. But all that was stopped long ago; in a few places, the torn-up gaps have been replaced with metal roads, which have required more looking after and repairs in two years than have the old roads of the Republic in two thousand.

By metal road, it may be necessary to explain, is not meant a road of any metallurgical properties or coverings, but the kind of broken stone used for and usually rolled into the surface. This "metal"—or rather mineral—is generally the common grayish-blue-tint flints visible on railways laying claim to "standard rock ballast track."

During travels in Australia, I noticed that most of the country roads were of this type of "metal" material. Well rolled, it is a most satisfactory road, but it can only be properly and economically rolled with a steam roller. But if the metal is not steam-rolled or indifferently worked in, the road is pronounced a curse by every automobilist who travels it. For obvious reasons—for what tires, solid or pneumatic, can successfully negotiate those knife-edged flints?

The roads of Australia were a pleasant surprise. I did not expect to see a young country so well advanced. In India the British military roads are fully "up to standard"—the English gave that much to the Hindus, although otherwise (after six months spent in the country) I am obliged to pronounce British administration in India a successful failure. The country is all misery and squalor. There are no such things as "oriental magnificence and splendor."

France possesses, of course, the best roads on the globe. Her system of construction is, of course, her own; hence the term, a French road. Macadam probably got his idea from the French, and gave his name to the system known as Macadam roads, for the two methods are almost identical, consisting of properly-proportioned layers of hand-sized stones, gravel, lime and sand.

Russia has only half a dozen good highways. It is scarcely in a Russian to build a good road. He knows far better how to build up his pockets with the moneys voted for the roads.

WHAT IS THE LONGEST HIGHWAY IN THE WORLD?

In the Russian Union you will find the longest highway in the world. It extends from the frontier of the old Polska Republic, to the headwaters of the Amur, in Eastern Siberia. That is a stretch of approximately 5,000 miles. It crosses four ranges of mountains—the



Photo. by Podyopof, Vladivostok

A Workman's Hut on the Great Siberian Road (Note the Sign Post)

Urals, Central Siberian, Altai Spurs (Circum-Baikal), and Iabloni; also a dozen great rivers. The writer has covered the whole route, so knows whereof he writes. It is practicable for an automobile throughout; but oh, how rough and tough it would be in parts! To attempt the journey, it would almost literally (to use a vulgar expression), "shake the life out of you."

In February, '98, I was quite curious to watch the "change of

frontier" between Russia and Germany. That is to say, I was leaving Russia *en route* across Germany and France, and back home to America, and wanted to observe closely the sudden change passing from Russia to the land of the Teuton. I expected to find it like any other frontier country—that is, people on both sides for several miles understanding each other's language. Never was I so much surprised, and disappointed. On the Russian side, a people understanding Polish, Russian, French and German (in great part); on the German side, a people who, for a very large part, only understand German. On the Russian side, diabolical excuses for roads—slush, mud, or deep sand, right up to the dividing-line little river marking the frontier. On the German side, directly you cross the river, a well-built system of roads. I spent a week touring about this frontier country. On one occasion, I particularly wanted to see the interior of the Russian fort at Alekcandrofna. To get a pass was, of course, hopeless. So what do you suppose I did? I deliberately walked past the sentry, was challenged, invited into the guard-house, questioned, then invited before one of the officers. While thus being "invited" about, I saw all I wanted to see; and the officer, seeing my papers *en regle*, politely asked me to take refreshment with him, which I as courteously declined, and was permitted to leave as I ostensibly entered—a passing tourist. But I would not advise anybody else to try the expedient.

Evidently, if ever Russia and Germany go to war—an improbable contingency—and Germany invades Russia, she will find the stick-fast Russian roads a chief obstacle—that is, if the mistake is made of trying to utilize them.

We read in history that the great French invading army of 1812 was destroyed by the Russian winter snows and cold. Nothing of the kind! The writer has covered much of the ground that the grand army covered, also during winter, and can safely say that the French army was principally destroyed by the interminable Russian roads of mire and muck and slush.

My experience of Latin-American roads, during two and a half years of travel in Spanish-America, is that they are either all dust in warm weather, or all mud in cold weather. This is particularly the case in Argentina. Outside of the cities, it is possible to use an automobile, but highly impracticable.

#### ROADS WHERE NO AUTOMOBILE COULD LIVE.

In parts of Iberia, there are so-called highways, where the trickiest of trick automobile drivers would not dare venture. The "roads"

are blocked with rocks from time immemorial. A thousand years ago, the Moors wended their way sinuously along these roads, in and out and around-about the huge stones; the Spanish of the present day are doing precisely the same thing. But gradually—two or three miles a year for the whole country—these boulder-blocked roads are being blasted and leveled.

As to tires. Wide tires are always best, under all circumstances. Take no notice of theorists who argue that under certain conditions,



Photo. by Latpabiata, Ekaterinburg, Siberia

Peasants' Houses on the Siberian Road

narrow tires are an advantage. There is no exception. I would recommend some of the theorists to lug a hand-cart around, loaded with wood, over all sorts of surfaces—from an earth road to an asphalt surface. At the end of a week they will have no two opinions. Don't employ a horse to do the work with registering scale. Horses can't speak, and the registering scale only represents one aspect, sheer pull. Do the pulling yourself, and you will come out in favor of broad tires.

Conclusion.—Broad tires and narrow roads would seem to be, judging by old Roman standards, the solution of the good roads problem. By narrow, say, 15 feet, or wide enough for two vehicles to pass. It stands to reason, that if a road is narrow, it is self-wearing-even. It is far more economical to build, quicker to construct, and easier to maintain, when it needs looking after. We see proofs of this in our own country districts; narrow roads that are almost "hard as adamant," while the wide roads are often unspeakable muck-furrows.

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## Cylinders of Hydro-Carbon Engines

**I**T seems to be generally admitted that one of the main requirements of the successful hydro-carbon engine is that it shall be well made.

While this is, of course, true of any machine if the best results are to be obtained, it is probably more essential to the internal combustion than to any other, owing to the extremely high temperature which exists in the cylinders. Nor is good workmanship the only requirement, for the proper proportioning of the cylinders is also essential to avoid distortion or unequal expansion at these high temperatures. Those who are most familiar with this type of motors do not hesitate to credit the excellent results obtained from the DeDion motor to this combination of proper design and good workmanship. Whatever the cause we know they do exceedingly good work, even in small sizes, and the most successful builders in this country are combining the same good qualities.

As the cylinder and pistons heat up they are apt to expand differently and seriously affect the fit, and consequently the leakage in the cylinder. This accounts for many instances where motors have run well till they heated up and then began to weaken till they cooled down. This is a point that has cost many dollars to inventors and experimenters, and, also, why so many makers buy the motors and mount them according to their own ideas. There is more to it than appears on the surface, and this is a point not told by drawings or blueprints.



## 1901 Trials of Heavy Motor Vehicles

**A**N organization which perhaps more than any has been the means of development of motor vehicles in Great Britain is The Liverpool Self-Propelled Traffic Association. This body of men, which is, really speaking, a scientific society and is the local centre of the Automobile Club of Great Britain and Ireland, has gone into the investigation of self-propelled vehicular and locomotive road traction in a most exact manner, and all the experiments and tests carried out by it are recognized as authoritative.

In June of this year this association intends to carry out a series of trials of motor vehicles suitable for heavy traffic. The object of these trials is to provide means of making a preliminary test of heavy motor wagons suitable for hauling operations in Lancashire prior to their being taken over by a Lancashire syndicate which will be formed for the purpose of conducting road transport between the City of Liverpool and the manufacturing towns in that part of Lancashire. The trials will take place on June 3, 4, 5, 6 and 7 of 1901.

The following gentlemen will act as judges: Mr. Everard R. Calthrop, Mr. S. B. Cottrell, Professor H. S. Hele-Shaw, Professor Boverton Redwood, Sir David Salomons, Mr. Henry H. West.

The general regulations applicable to all vehicles are:

- (I.) The vehicle shall be self-propelled and self-contained. It shall be propelled by mechanical power alone, but there shall be no restriction on the source of such power or the nature of the agents used.
- (II.) The vehicle shall be capable of going anywhere that a horse-drawn vehicle carrying the same load is ordinarily required to go, and of being placed in the same positions and withdrawn therefrom without external assistance. The particular manœuvre most generally called for is to work into and out of a loading berth when cramped for room. This requirement arises in the case of embayments, or of confined spaces between other vehicles in a line receiving or discharging goods. Carters usually back into such positions obliquely and bring the vehicle into line by turning the leading wheels at right angles to the rear wheels and again backing, but it is open to competitors to perform the manœuvre as they think best.
- (III.) The vehicle shall be capable of working into and out of

an embayment of one and a half times its own length. (IV.) The vehicle shall be capable of starting from rest on and mounting a gradient of 1 in 9 (sets). (V.) The capacity of any water tanks, whether the same be fitted for feed, cooling or other purposes, shall suffice for a run of 15 miles on the basis of the consumptions during the trial runs. (VI.) Such portion of the platform of the vehicle as is designed to carry the load shall be level, and the height of the floor line, measured either when light or when laden, shall be not less than 3 feet 6 inches, and shall not exceed 4 feet 3 inches. (VII.) The vehicle shall conform in all respects to the requirements of the Locomotives on Highways Act of 1896, and, in the case of its being oil-propelled, of the "Regulations as to Petroleum" issued by the Home Secretary under Section 5 of this Act. In Class C, intended for vehicles for export to the colonies and abroad, there is no tare limit, but the other regulations must be adhered to. (VIII.) All working parts shall be properly encased. (IX.) The boiler, tanks, oil-baths and connecting-pipes shall be fitted with drain-plugs at their lowest points. (X.) The cross-section of any pipe connecting two tanks shall be not less than that of the pipe provided for filling the first tank of the two. (XI.) Provision shall be made to lock the compensating gear.

The following are the points which will be taken into consideration by the judges in making the awards: Cost, control, working and construction. The various classes of vehicles will be subject to different restrictions.

This competition is international in character, and a letter received from the Honorary Secretary of the association expresses the hope that some American built vehicles will be among the competitors. Full information regarding the trials may be had by addressing E. Shrapnell Smith, Royal Institution, Liverpool, England.

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Why is it that so many of the builders of steam vehicles seem to stick to the throwing of the lever forward in order to reverse the engine? It would seem that, when a vehicle is required to go ahead, the movement of the lever to accomplish this would be a forward movement, and not as is now usually found a backward motion. Of course this is not a very important matter yet it would be more natural if, when you desired to make the engine go ahead, you pushed the lever ahead instead of pulling it backward.

## From Cleveland to New York

BY ALEXANDER WINTON

ON the early morning of November 1, 1900, in company with T. C. Collings, I left Cleveland and headed the machine East.

During the preceding days the rain-fall had been generous in this section, and advices from the Weather Bureau were that the fall had been considerably heavier in those sections of Pennsylvania and New York through which we were compelled to travel. It was a some-

what discouraging report, but the morning of Tuesday, November 1st, broke clear, and we started.

The run from Cleveland to Silver Creek, N. Y., was made without incident. The roads were quite soft and pretty bad in stretches, but pretty good time was made notwithstanding. At Silver Creek it began to rain, and the general disagreeableness of the situation was augmented by a driving south wind. At Buffalo, we missed the road which we had intended to take. Hoping to cut off a corner, we cut around and got on the Broadway Road instead of the Genesee turnpike (Old State



Alexander Winton

Road). The course taken was a clay road, and with the continued rain and consequent slippery roads there was at times great difficulty in making anything like satisfactory speed. There was considerable sliding from one side of the road to the other. About 30 miles out of Buffalo it was dark, and of a sudden I realized that we were at the top of a long, steep and dangerous hill. I stopped the machine and listened. Down in the blackness could be heard the pounding of waters. It seemed as if there was a water-fall, and I thought that possibly the heavy rains and consequent swollen streams had washed away the bridge. Collings detached one of the head lamps from the machine and went forward to reconnoiter. He had been gone and out

of sight for fully ten minutes when I began to entertain fears lest something had happened to him. But presently I saw the lamp flickering far below and in a while he had joined me at the summit. "Pretty tough proposition this," was his observation. "It's a steep, uneven and slippery grade, and at the bottom is a narrow bridge unprotected by rails on the sides; below the bridge, about 50 feet, is a river. If we go over the sides of that bridge, it's all off."

It goes without saying that the descent was commenced with extreme caution. I ran the left side wheels in the gutter to prevent slipping, and Collings walked behind and held the back end of the machine to aid in keeping her straight. The nearer we got to the bottom the louder grew the noise from the water below us. It was an intensely lonesome spot. At last we reached the bridge, and I never was so careful in my life as when we slowly crossed it. It was a stone bridge, and the roadbed across it was rounded like a "hog's back." When well over it I breathed more freely.

The hill on the other side was mastered without difficulty. At the top we could see the lights of Darien. We stopped there for the night. It was then 6 o'clock, but very dark, and the day's run was about 250 miles. When conditions overhead and under wheel were considered, the day's mileage record was wholly satisfactory.

At the hotel in Darien a cheerful and bewhiskered farmer said: "Say, mister, you took darn mean chances running over that pesky bridge in the dark during a rain. Just a year ago a wagon, horse and driver slipped and fell into the river. Man and horse both killed, wagon smashed to splinters." This remark made us feel glad we got safely over, and we did not have the slightest desire to make more local history by plunging down over the rocks with an automobile.

The hardships of that day's travel were responsible for a long sleep, and it was not until 10:30 next morning that we were breakfasted and ready for the road. At our beginning of the second day the sky was clear. It had stopped raining during the night, but the roads were soft, and fast driving was accomplished with no small danger. We had gone about 45 miles on our second day's journey, and were running over a somewhat improved stretch at about a 35-mile per hour clip, when bounding from a farm-house yard came a big black dog, that looked as huge as a well developed calf. He miscalculated his distance or supposed the machine would "shy" or turn out—but it didn't. The canine was struck "amidships," and barks no more. He really did not know what had struck him. My machine was equipped with a

steering wheel. If I had held a lever it is safe to presume that the shock from contact would have put us in the ditch. We made a good run to Geneva without further accident. Roads were drying, but the hills were something frightful. At Geneva we got our bearings and made for the State road, which should have been entered upon at Buffalo.

This cross road, about twenty miles in length, was the worst stretch of country I ever went over with a motor carriage. It was like a plowed field. We struck the State road about 4 P. M.; and pulled into Syracuse at 5:15. There we remained over night.

Next morning at 7 o'clock found us again on the road. The extremely rough roads from Syracuse east were due to washouts caused by the heavy rains. We bumped and bounded along like a rubber ball. When we got down near the canal the roads were quite impassable, and we were forced to take the tow-path for about 30 miles. The path was so narrow that at times part of wide tires would lap over the embankment. It meant slow work with a consequent loss of time which played havoc with record work.

We finally got back on the main road, but through this section it had rained hard during the preceding night, and the roads were dangerously soft and slippery. At this point occurred a misadventure which came near terminating the expedition. Going at about 15 miles per hour through a small plantation where trees grew close at either side of the narrow road, I started to make a small turn in the course when the machine slipped, swung around and dove off the path and into the young forest. About a half a dozen small hickorys were struck by the front axle. They bowed down and we crawled up along their bark. The front end of the machine was clear from the ground. Luckily we were not thrown out of the carriage. When it was realized that no accident to ourselves had resulted, we looked at each other and could not help but laugh at the intensely humorous situation. There we were, miles from any town and doing our best at climbing trees with an automobile. We climbed down upon the ground, and battled with all the power within us to pull the machine down from the trees. It would not yield. The next two hours were spent with hammer, chisel and jack-knife. The interfering trees were cut away close to the ground, and we then put on power and got back into the road.

After getting out of this predicament, we had gone on only a short way when a turn in the road disclosed the main road obstructed by a sign, "No road; take road to left." Accordingly, we turned on

a fork leading to the left, and soon came to a river, the bridge over which was being reconstructed, and closed to traffic. The stream was nearly 100 feet wide at this point, and the water was muddy. The bridge constructors told me, however, that it was not more than two feet deep with a fairly good bottom, and that pending bridge repairs the farmers forded the stream.

There were no two ways about it, so the machine took to the water. The banks on either side were soft and marshy, but offered no great annoyance. The stream was, as has been stated, not much more than two feet deep in the worst places. The machine went through without a hitch, although in some spots the bed was rocky and very uneven. Two hours later we discovered that a tire was punctured. We got all things ready for the repair while we continued to run, and when all was in shape stopped the machine, pulled out a big nail which had caused the puncture, Collings attached the foot pump, I inserted the plug, and in just five minutes we were aboard and on our way rejoicing. The repair was complete; there has been no leak since. That night at 6 o'clock we reached Schenectady, N. Y., and anchored for the night. Six o'clock next morning saw us on the road again, and in a fog so dense you could scarcely see a machine-length ahead.

Taking the "old road" we traveled over the remains of the first railroad ever built in this country. The big boulders on the sides caused a little bending of the rims—but no great diminution of speed. Got through Albany without incident. We crossed the river and went over the East Shore Road from Albany. At Croton I again missed the road. It was dark and our lamps were lighted. The route taken terminated in a "cow path." I pulled up and was wondering what had happened, when from the dark recesses of the woods there came a young man and a maiden.

I was told that the road to New York had been left several miles behind. I turned about, and finally got on the New York road. At McComb's Dam bridge there was some repairing going on, and almost in the middle of the road, unheralded by red lamp, was a pile of structural material, into which I crashed with a force calculated to wreck something. No harm resulted to the machine, however, and we were enabled to complete the ride and run through to Madison Square Garden without further incident.

I might say that the chief object of this run was to further test some of the many improvements in our 1901 machine.

Our frontispiece shows Mr. Winton accompanied by his running mate, T. C. Collings, just after finishing their interesting journey—Ed.

## The Automobile

Did you think that I came from the hand of man,  
That I sprang from a human brain ?  
Did you think that a genius drew my plan  
And 'stablished my earthly reign ?  
The genii back of the ancient night  
Were sponsors upon my birth,  
And I was born of the wings of light  
For a wingless course on earth.

In city street or in country lane  
They hover when I go by ;  
They draw my life from the bolted chain,  
From mastered flame of the sky ;  
The bolts and rivets and bars and wheels  
May labor and rock and roar,  
But the will of the genii through me steals  
And the leagues behind me soar !

I am a dream of the things men thought  
When the high gods walked the world,  
When Hercules at his labors wrought  
And the bolts of the anvils hurled  
Their song of might in the morning light  
Of the dawning strength of man,  
And the seas were poured from left to right,  
And the earliest rivers ran !

I slept an age in the beaming sun,  
I rocked in the ocean's lap,  
I followed the path that the lightnings run,  
I laid for eons to nap  
On the breast of the wind of the whirling spheres ;  
In the molten cradles I lay—  
A babe of the immemorial years  
Born out of the Past for To-day.

I am one with the wind of the surging storm,  
And one with the summer calm ;  
I yield my will to the powers that form  
My speed to a woman's hand ;  
A child may master by levered force,  
As docile and meek I smile  
At the ancient shadow they called a horse,  
And cherished for speed and style !

## THE AUTOMOBILE

But ever the breath of the blast is mine,  
 And my veins are bolts of flame ;  
 Unseen, they follow with eyes that shine,  
 That genii from whence I came—  
 The gnomes of the air and the eerie souls  
 That breathed on the brain of man  
 And gave him the key to the force that rolls  
 Through the artifice of my plan.

Wingless, yet winged with the ancient dream,  
 Fired with the ancient fire,  
 I come from the bourne of the lightning's beam  
 At the call of the new desire !  
 I type the progress of force and thought,  
 The need of the later time,  
 Whose arch is based where the high gods wrought  
 In the flush of their potent prime.

Borne with the dream, that may yet come true,  
 Of ships with the speed of light  
 Sailing the seas of the central blue  
 To ports of the starry night,  
 I take the road or the crowded street,  
 The hill or the level plain,  
 I, and the genii who follow fleet,  
 In the pride of our earthly reign !—(Ex.)

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The Columbia University recently announced that students who so desired can now take a course in motor vehicle construction. In adding such a course the faculty says: "The motor vehicle has now become such a factor in commercial and private use that it is deemed as essential that a mechanical engineer should now be well posted in motor vehicle construction as in marine, stationary or locomotive engineering." Some time ago the International Correspondence Schools announced a course in gas, gasoline and oil engines, in which special attention is given to the application of such engines to motor vehicles.



## The St. Louis Automobile

THE accompanying illustration shows in how many avenues of activity the automobile is becoming a formidable rival of the horse. The motor vehicle is a most desirable thing for a tour through the beautiful country. If you wish to stop by the way as the party shown in illustration, you do not need to tie your horse to some nearby tree. You need not fear a runaway, and it is not necessary to



The St. Louis Automobile Trap

spread blankets over your horse to protect it from the flies in warm weather.

The machine shown was made by the St. Louis Automobile and Supply Company, St. Louis, Mo., for shipment to Mexico, where it is to be subjected to severe service. The picture was taken while the machine was out on a test.

It is equipped with a double cylinder water-cooled engine. The cylinders are each 4 x 5 inches. This engine makes 600 revolutions per minute. The gasoline tank is placed under the seat, the gasoline being led to inlet valve by means of a one-eighth inch brass pipe.

The frame is built up of angle iron, and is made amply strong to stand hard service. After the engine is started the vehicle is practically controlled with one lever, the longer one, the other being used for shifting the gears. The vehicle will climb a 25 per cent. grade nicely, and so will be found equal to any emergency likely to be encountered on any road. The water tanks are placed in the side of the body, near the rear. These are made of corrugated copper and carry enough water for a run of 75 miles. The carriage is provided with a folding seat in the back, thus rendering it possible to carry four passengers when necessary.

The machines are substantially built, and the best workmanship is employed in their construction.

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Don't try to turn off at an angle suddenly, especially when near trolley tracks which are a little higher than the road.

Don't try to do stunts in a crowded thoroughfare.

Don't start out on a run without first knowing how you stand in the way of gasoline.

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The Pennsylvania Automobile Club, with headquarters at 138 North Broad street, Philadelphia, is very much interested in the automobile show, to be held in that city, February 4 to 9, 1901, under its auspices. Diagrams of space are ready, and can be had on application at the office of the managers at the above address. There will be an eighteen-foot track, where vehicles will be shown in motion. This track will be almost 12 laps to the mile. The Second Regiment Armory is to be the seat of action, which has a floor space of 32,000 square feet.

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The Central Passenger Association recently decided that automobiles are not baggage. Automobile owners claimed the same right as owners of bicycles, but the railroad companies said they might as well argue that horses and carriages ought to carry brass tags and be transported free.

## Three Thousand Miles With a Steam Carriage

By GEORGE E. GREENLEAF

**A**FTER keeping horses for pleasure purposes for several years, the writer sold them, and made a mental resolution never to buy another, unless necessary for business purposes. This resolution was faithfully kept for twelve years, in spite of temptation.

About a year ago the purchase of an automobile was proposed. This naturally led to inquiry into the merits of the different systems, using as motive power, electricity, explosion or internal-combustion engine, and the steam engine.

An electric carriage would have had the preference, but was out of the question on account of difficulty in getting batteries recharged, short radius of action, large cost of running and probable great depreciation in the battery, leading to expensive cost of maintenance.

A carriage driven by an explosion or internal-combustion motor seemed to be more desirable than a steam-driven carriage, but on inquiry of friends, who were owners, and an examination of some of the carriages, all seemed to have very noisy engines and gearing, offensive smelling exhaust, and in addition to these, considerable trouble with the engines, from various causes.

These reasons, and the fact that the writer had a fair knowledge of the construction and operation of the steam boiler and engine, decided the matter in favor of a steam carriage, and one was accordingly purchased.

In due time the carriage arrived and the instructor proceeded to explain the use and operation of the different parts, following this by raising steam and going out on the road for a lesson in steering and speed control. It was with a decidedly nervous feeling that the writer took the instructor's place on the seat and, obeying the instructor's injunction to push the throttle lever slowly forward, did so, and felt the carriage start forward. A short run proved that the carriage was so evidently under complete control that the nervousness passed off and has never returned even when running on the most crowded streets.

With the exception of one week from causes described later, this carriage has been used every day from the first of June to the first of December, running in that time about three thousand miles.

A few details of experience gained with the carriage may be of in-

terest. Before accepting the carriage the attachment of an auxiliary hand pump and the enclosure of the lower part of the engine wheel—it projected below the carriage body—were insisted on. Although told that the latter was unnecessary, it needed only a glance at the front of the engine cover at the end of a run over dusty or muddy roads to show the wisdom of this precaution. The front of the cover was invariably covered with dust or mud, which would have been thrown into the running parts of the engine, if left uncovered, and in combination with the grease oil in the bearings and slides, would have resulted in very rapid and destructive wear.

Before attempting any long runs a thorough and careful study and inspection of all parts of the carriage were made, covering the operation of the engine, places for oiling, methods of adjusting the bearings for wear, and packing the glands of the piston rods, valve rods and pump plunger.

The location of hot steam pipes was thoroughly impressed on the memory by parting with various pieces of cuticle.

A thorough inspection of the carriage is made before going out on any run, no matter how short; and to this careful inspection may be attributed our freedom from all accidents except such minor happenings as will occur in any machine.

The automobile is only a machine, and no part of it is so complicated that a man of good intelligence cannot readily understand its mechanism and operation if he will take the necessary time and patience to do so. This may involve some unpleasant work and an extremely dirty pair of hands, but the operator will feel well repaid for his trouble the first time something goes wrong on the road, which his knowledge, thus acquired, enables him to remedy, and go on his way.

The first thing to be repaired was a pump plunger lever. This broke in the plunger pin-eye, the break being due to excessive wear, caused by screwing up the plunger packing too tightly.

This packing should not be set tighter than will allow the plunger to be moved with the fingers; a very slight leaking of water around the plunger does no harm. This was easily remedied, and the new lever has been used about two thousand miles now, showing only a very slight amount of wear.

The next event was the breaking of a ball in the crank-pin bearing. This caused a delay long enough to allow of taking off the cover plate on the connecting rod and cleaning out the pieces of the broken

ball. After inspection of the bearing it was considered safe to use, and we finished our ride. A new ball was easily put in after reaching home.

When the carriage was received it was not equipped with a water column, consequently the gage glass was the only reliance for determining the height of water in the boiler. It did not have a very good arrangement of piping for blowing out the sediment which will accumulate in the pipes. In consequence, the bottom connection to the gage glass became clogged with sediment, and this caused a false height of water to be shown in the glass, indicating plenty of water in the boiler, when, in fact, there was none at all. This resulted in a badly burned boiler. Fortunately it happened near home, when returning from a ride. This accident involved sending the boiler back to the makers for repairs, losing the use of the carriage for a week, and is the most serious accident I have had.

A water column, with try-cocks was then put on, and the piping so arranged that the bottom connection to the water column acted as a sediment trap. A blow-off cock was put in the lowest point of this pipe, and a globe valve in the top connection to the water column.

By closing this globe valve and opening the blow-off cock the sediment can be blown out as often as desirable. As the water we use is very hard, containing carbonate of lime and magnesia, we have adopted the plan of blowing off about a quart of water every time the water tank is filled, and have had no trouble with sediment since.

The water gage glass is usually provided with a check valve at each end, which will close automatically if the glass breaks; these check valves are also provided with a valve which can be closed by hand. If such combination valves are used, it is a good plan to remove the automatic check from the upper valve, as the jarring received on the road and the use of the try-cocks on the water column, if the gage glass be connected to it, will often cause the automatic valves to close, and thus show a false height of water in the gage.

If the automatic check be left in the lower valve, the escape of water in consequence of a broken glass will be prevented by it, and the escape of steam from the upper end can be stopped by the hand valve in the upper check. After replacing the gage glass the admission of steam by opening the upper hand valve will cause the lower automatic check valve to open. The connections in which the gage glass is held should be in line with each other, so that the glass will not be in contact with metal when in place. The rubber packings of the gage glass harden under the action of the heat, particularly the upper one, and

when this occurs new packings should be put in. It is well to use considerable care in packing and setting the gage glasses, as this will be well repaid by increased freedom from breakage. My first gage glass has not broken yet.

It should seem unnecessary to advise that one should know that the fuel and water tanks are filled before starting out, but a little extra care on this point may not come amiss. The writer has had the unpleasant experience of finding himself three miles from a can of gasoline with grave doubt as to whether there was enough in the tank to carry him to a fresh supply or not. On a long run it is always best to fill the fuel tank at every opportunity, as gasoline is not to be obtained at every place, although most druggists and all plumbers keep it on hand. We have had difficulty in obtaining a supply only once; this was in a small town on Sunday when all places of business except the drug stores were closed. A visit to both druggists' resulted in two gallons which were enough to take us to a town where the tank could be filled.

The average distance covered per gallon of fuel is between twelve and thirteen miles, including the amount necessary to raise steam from cold water. Over certain roads it is not unusual to make fifteen and sixteen miles per gallon, but these are excellent telford roads without steep grades. Twenty gallons of water will usually last for twenty-five miles, but there have been occasions where this amount has only lasted for twelve miles on account of deep sand interspersed with large boulders causing a heavy demand for steam.

The pneumatic tires with which the carriage was equipped caused more trouble than anything else. Although used principally over fine telford roads, punctures were numerous, averaging one every three hundred miles from causes ranging from wire nails to horseshoes and broken bottles.

The more serious punctures necessitated sending the tires back to the makers for repairs, which would have involved losing the use of the carriage for three to five days, except that a spare tire was kept on hand.

Finally a semi-pneumatic or cushion tire was tried, with the result that this tire was adopted, and since that time no trouble has been experienced with the tires. From the use of these tires, it is the writer's firm conviction, that pneumatic tires are a needless annoyance on a carriage which does not weigh more than 1,000 pounds when loaded. With the tires now in use the carriage rides as easily as on the

best pneumatic tires, and requires no more power to drive it, as proved by the mileage per gallon of fuel and water over the same roads.

The boiler has been inspected and subjected to cold water test twice during the past season, and it is the intention to have this done every three months hereafter.

There have been no leaky tubes in the boiler, and while there have been some small leaks in various steam pipe joints, there have been none which could not be stopped in five minutes.

If the water used be hard, the blow-off cock should be opened at the end of a run, and about two inches of water be blown out of the boiler before the pressure goes down; not allowing all the water to be blown out of the boiler, however, as the sudden cooling induced would strain the boiler severely, and frequent repetitions of this practice would cause a leaky boiler.

After the pressure has gone down the boiler may be emptied and washed out, if necessary.

Several friends predicted that the carriage would be on fire before it had been in use very long, but this cheerful prophecy has not come true, perhaps because extra precaution has been taken to keep all joints in the gasoline pipes tight, paying particular attention to the unions at each side of the fire-box and to the pipe passing across the top of the boiler. Two bad cases of burning of boiler tubes caused by this cross pipe leaking have come to my attention.

If the owner of an automobile will carefully study the mechanism and operation of his carriage until it is perfectly familiar to him, so that he knows when the parts are performing their functions properly, the feeling of surety which this knowledge will bring when on the road and far from the repair shop will amply repay him.

Let him inspect the carriage thoroughly himself before going out, even if he employs a man to take care of it. The prompt replacement of a pin or tightening of a loose nut may prevent a breakdown on the road.

The old saying, "an ounce of prevention is worth a pound of cure," is particularly applicable to machinery.

## Automobiles at The Glasgow Exposition of

1901

OUR readers are probably familiar with the fact that, during 1901 the City of Glasgow, Scotland, is to hold an International Exposition. Glasgow is a city of many industries, but, perhaps, none is so important there as engineering, which would perhaps be better described as machinery construction. Among the many kinds marine and locomotive engineering, of course, take leading places, but there is besides an amazing variety of machinery manufactured, from Barr & Stroud's range finder, an extremely delicate instrument, capable of deciding the exact distance to a visible enemy up to ten miles, to mammoth cranes, capable of handling the engines and boilers of the largest vessels afloat. It would, therefore, be little short of a misfortune if, in an exhibition held in such a city at the beginning of the twentieth century, the automobile exhibit were less than fully representative. The exhibition will be the first held in Britain since the emancipation of the automobile by the repeal of the Highway Locomotives Act, a law which, by practically prohibiting the use of automobiles on public roads, did so much to paralyze inventive genius and manufacturing enterprise; and it is now being recognized that the Glasgow exhibit can be made to have far reaching missionary effects in forwarding the great horseless carriage movement. Not only will the collection of machines be large and varied, but a week will be specially devoted to a series of demonstrations with all kinds of motors to show their capabilities, and their reliability in regard to speed, distance, and amenity to control. These demonstrations will be under the auspices of the Automobile Club of Great Britain, assisted by a number of the leading makers. The club will, towards the end of the summer, tour for 1,000 miles, concluding with the week in question, and, as the club is well organized and strong both numerically and financially, the demonstrations are certain to be popular, as well as educationally valuable.

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It is announced that in New Haven a concern is interested in the design and manufacture of automobile hearses. It is said further that the people are just "dying" to ride in them.



*(We desire those interested in both the manufacture and operation of Automobiles to send in for use, in this department, whatever they think may be of interest to us or our readers.—EDITORS.)*

## That Automobile House

**I** READ the letter of Frank C. Hudson in your issue for January with a good deal of interest. Any points of interest on the subject of caring for automobiles will be of great value to men like myself, who, while fortunate enough to be an owner, have to pay out considerable each month for the proper storage and repair of my vehicle.

There is one point I think in which the value of Hudson's barn could be materially increased. It is found that in all livery stables means are provided whereby the carriages may be washed. The introduction of a faucet, arranged so as to permit of hose connection, should not be lost sight of. This could easily be done, and at slight expense.

Another point which should not be overlooked in this connection is that when it comes to putting down the floor, it should be depressed at the point where washing is done, as otherwise you are liable to be caused a great deal of labor in keeping the floor free from dirt.

In one part of his letter Mr. Hudson says: "The pit is on an angle in the corner, with steps down from the back end \* \* \* The idea of the angle is that the carriage can be backed on from the door, and can be run straight out the door without doing the obstacle race act." Why would it not be a good idea to put in a small turntable, which would enable you to "head on" the carriage for any desired point? Perhaps some readers who have looked into this question can help me by relating their experience along these lines.

SEATTLE, WASH.

NED GALLIDAY.

## Not How Cheap, But How Good

**H**OW many times have we heard the question asked: "Why don't you make the automobile lighter in its construction?"

This is the first and foremost idea that the layman of to-day has in his mind regarding the horseless carriage, and is one of the most important points as well as first steps to be taken into consideration by the manufacturer in order to insure perfect safety.

A few moments' consideration of this subject will bring out more clearly the advantage of heavy construction and tend to lessen the number of accidents which occur from day to day, enlighten the purchaser in the matter of selecting his vehicle, and insure perfect safety in the general make-up of the carriage. A vehicle made of too light material simply means constant delays and an endless amount of expense.

Of necessity the carriage or wagon must be heavy enough in its parts to carry the load for which it is designed, and constructed of the best material the market affords. A given cross section of any metal has its limit as to the strain imposed upon it. We must have at least 25 per cent. over and above this limit in order to be on the safe side and ready to resist the extra strain which from time to time each part is called upon to carry.

Too light construction is all wrong and only tends to wreck the interests of the manufacturers and the marketing of their products. Heavy construction is of absolute necessity, not only in the line of safety, but to obtain better traction.

We certainly would not place a light horse and wagon in use where it really required one of heavier make simply because it cost a few dollars less in the start. No wise man would do this, for the general repairs on the wagon alone, to say nothing of the life of the horse, would cost much more than the price of the heavier equipment and the one that is properly designed for its particular line of trade.

A good example of this can be had by referring to the January issue of this magazine, page 92. This vehicle in question, after being run for a period of two years, and over all kinds of roads, had as a repair bill about \$1.50, and this was in the way of replacing the rawhide pinions which transmit the power to the wheels, which from one cause or another had "stripped." It will be remembered that an increase of 35 per cent. was figured in this case, and is a good example of what

may be obtained from heavy construction and best material. If in the first cost an extra few dollars had been expended we would have had a saving of several hundred in general repairs.

The saving of ten cents on a set of carriage steps is looked upon by some people as a great thing, and rather than pay for a good drop-forged step they will use one of the cast iron make. The breaking of one of these cheap steps would not only injure both life and limb, but the business and sales of their vehicles in the long run. This is of minor importance when compared with other parts of the vehicle. A vehicle constructed of any other than the very best material is far from cheap, no matter what the price may be.

NEW YORK, N. Y.

H. M. UNDERWOOD.

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## That Automobile Explosion

THE following item appeared in the columns of the New York *Sun*, Thursday November 29: "Lawyer Albert Brown, of Manhattan, started yesterday in his Locomobile to visit his brother, Percy Brown, a lawyer, who lives at Hempstead, L. I. At Glenmore and Railroad Avenues, Brooklyn, the gasoline exploded and set fire to the machine, which was damaged \$125 worth. Mr. Brown continued his journey on a trolley car."

A few days after the item appeared, the New York *World* came out with an editorial, in which reference was made to the foregoing item in the following words:

"It was an unfortunate, or perhaps it was rather a fortunate occurrence that Mr. Albert Brown's gasoline automobile should have 'blown up' just at the time when the automobilists are protesting against the government regulation which forbids their use of ferryboats or other passenger steamers. If the accident had occurred on one of our crowded ferryboats or excursion steamers the consequences might have been very disastrous. The danger of explosion on passenger steamers cannot be too carefully guarded against, and the gasoline engine has no place on any of them."

It is, I think, decidedly unfair for the latter paper to so condemn the gasoline automobile. As a matter of fact there are large numbers of gasoline and naphtha engines in satisfactory operation, as the *Sun* pointed out, and the number of accidents with them is very small in-

deed. I do not know, of course, how the accident happened. Some one must have in some way brought fire near the gasoline when exposed to the air, otherwise it would not have occurred. Gasoline is harmless when confined in some kind of receptacle. If a light was through carelessness on the part of someone, placed too near the escaped gasoline then it was not the fault of the gasoline, but of the party in charge.

The *World's* reference to the danger which might have attended the explosion, had it taken place on board one of our ferryboats, is too radical to be considered very seriously by those familiar with the use of gasoline. The properties of gasoline are well enough known, and when properly handled, it is one of the most useful of liquids.

It is probable that the explosion referred to was caused by a leaking pipe.

The *World* says: "It was an unfortunate, or perhaps it was rather a fortunate occurrence that the automobile should have 'blown up' just at the time when the automobilists are protesting against the government regulation which forbids their use of ferryboats or other passenger steamers."

This, I think, is rather strong, and while it is true the automobilist is now at a disadvantage in this matter, it is more than probable that at no very distant date automobilists will be permitted to take their vehicles across on ferryboats without being compelled to empty their gasoline tanks before running the machines on board.

HACKENSACK, N. J.

WALTER BROWN.

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## Insufficient Battery For Sparking

**M**Y experience leads me to believe that makers of gasoline motor carriages do not use large enough batteries, or batteries having a sufficient number of cells. A powerful spark will help almost any motor, and if the motor is inclined to go back on you the increased battery power is a great help.

My first introduction to this difficulty was in connection with my gasoline launch, where the motor had the habit of lying down once in a while after it got thoroughly warmed up. Then I doubled up on my battery and had no more trouble. The spark was large enough to explode almost any mixture, and, while it may not be right from the

maker's standpoint, it certainly is from mine, as a user. I suppose every user should be expert enough to tell the exact mixture of air and gas by the sound, but, as a matter of fact, they are not, and the question of getting home is the all-important question.

On my carriage I have doubled up twice on the battery, and I don't have any spark troubles. After the cylinders get hot I switch out part of the cells, but when I strike a bad road they all go into commission. I can't tell how much of a spark I get, but I'm inclined to believe it will explode almost everything but water. If I ever run out of gasoline out in the country I'll try kerosene and see how that goes. Some of my friends tell me I have battery enough to run home on if the gasoline gives out. At any rate, it gives good satisfaction, and I would rather spend ten dollars a year extra for batteries to avoid the sparking troubles some of my acquaintances have.

W. H. TRUMAN.

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## Know Your Machine

**I** HAVE read the article by Mr. Bostwick and some of the comments thereon, and, after I got over the first shock of the statements he made, I commenced to think he knew what he was talking about in most respects. Now, I believe a man who is careful, who knows something about machinery and doesn't try to see how fast he can go, can keep a good automobile for less than he can a horse. On the other hand, I haven't the slightest doubt that it costs many people more.

But the main point in the article was the advice to know your machine. Get acquainted with it thoroughly. Go to the factory if you can, and see how it is put together. See what each part does, and find out what will happen if it breaks. Learn to make all the points and to repair them on the road, if necessary. Carry such spare parts as are necessary, and be sure they fit. It is decidedly aggravating to carry around a spare part for several hundred miles and, finally when you want it, find it won't fit.

Learn the symptoms of the motor. How it sounds under different conditions, and what the sounds mean. If you do this, you'll have more comfort, and less worry and expense.

NEW YORK, N. Y.

FRANK C. HUDSON.

## Water in Steam Boilers

**I** HAVE discovered a few points in operating my steam machine which may be of service to others. They relate to the amount of water in the boiler, and may save you trouble and expense. If you haven't a water column on your boiler put one on the first thing. Every engineer ought to know where his water is, even if his gage glass breaks or gets stopped up.

Not having one, you are sometimes puzzled to know whether the glass is full or empty—it looks alike in both cases. Hold a piece of newspaper behind it and you can tell at once. If full of water the print will be magnified. If empty the print will be smaller than normal.

The tendency in case of low water, or in case of doubt, is to run for home as fast as possible, but it's a habit that wants to be overcome. If your water is low, the faster you run the machine the fiercer fire you are burning and the more chance you have of burning your boiler. Run slowly, burn a low fire and the less likely you are to have trouble. Don't be afraid of explosions, they are almost out of the question with the boilers they are building to-day. L. W. R.

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He feared no bucking bronco that went snorting o'er the plain ;  
He had tamed the brute for pleasure, and could do the same again.  
He had steered the ponderous mail coach where the rocky passes  
sweep  
In mystifying zigzags close to chasms broad and deep.

And sometimes he had ridden, in an economic stress,  
Out in front, upon the pilot, of the cannon ball express ;  
His reckless hungering for speed often tempted him to seek  
The joy of a toboggan down the nearest mountain peak.

But success must have its limit. Ere his mad career was through,  
He boasted once too often, and he met his Waterloo.  
He thought no pace too devious or swift to be for him a bracer,  
But he howled for help and weakened when they got him going on a  
motor racer.

(Ex.)

## A Kerosene Motor Driven Carriage

**D**URING the years 1885 and 1886 Daimler, Berry, Hardaker and Butler did some original work in connection with the operation of bicycles and motor tricycles, using petroleum spirit, but it was not until 1895 that petroleum oil was for the first time used for motor vehicles. This was done over in England by James D. Roots, conjointly with his partner, Mr. Venables.

The firm of Roots & Venables, of London, was the first one to successfully manufacture a motor vehicle in which a petroleum oil



Kerosene Motor Vehicle of Roots & Venables

motor was employed, and it gives us pleasure to present to our readers an illustration of their latest carriage. This is of three indicated horsepower and is fitted with their regular style motor. There are a number of advantages growing out of the use of petroleum, among which may be mentioned the following: It causes no deposit in cylinders or combustion chambers; greater safety, and is considerably cheaper than gasoline or petrol. The carriage shown has bicycle spoke wheels, those in the rear being 31 inches, while the front ones are 27 inches in diameter. Solid tires are used.

For igniting, a platinum point is used. The engine is of the single

cylinder type. This carriage is of light weight, weighing, when tanks are full and ready for the road, but 672 pounds. The frame is built up of channel iron.

The fact that the engine can be run by kerosene makes it more certain that one is not going to be stalled owing to lack of oil when starting out on a trip. It is just possible that gasoline cannot always be obtained, while kerosene can certainly be had almost anywhere. These carriages have been operated successfully for several years, and possess features which ought to commend them to automobilists who are looking for a light, safe, and easily operated vehicle.

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### A New Design of Automobile Engine

**W**E show on the following page a novel design of engine, more especially intended for automobile work in its design, and the aim has been to meet the following requirements: A perfectly balanced engine embracing nothing but the simplest elements, and those the same as the most common kind of engine; self lubrication; every working element entirely excluded from dust or dirt; and the entire control by a single lever.

The arrangements, as will be seen by the vertical section, consists of two cylinders, which may be compound, as shown, or both high pressure, set at right angles, piston rods and crossheads in one forging and the connecting rods taking a single center crank. The crank is built up with the connecting rods bushed, and running on a bush, and that on the hardened and ground crank pin, all in place to stay. The crosshead pins are hollow, hardened and ground, turning both in the crossheads and in the connecting rods at pleasure, and are held from coming out endwise by ledges cast on the frame.

The eccentrics are cast on the throws of the cranks, and the eccentric straps and rods are in one piece. Thus it will be seen that all the working parts, except valve and piston are within the casing, and as all the surfaces from the outside in, and inside out are filled with oil holes, and a lot of them, the splash lubrication is so complete that the take up for wear has been dispensed with. There are no bolts, nuts or screws or anything else inside the case to get loose.

The engine is controlled and reversed in the following manner: The two plug cocks, operated by the single temporary handle shown in

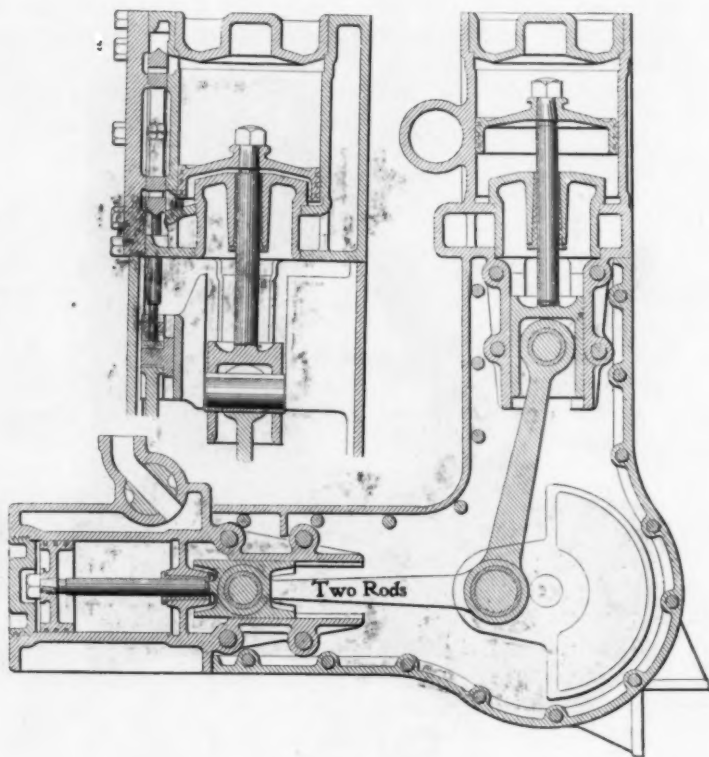
the half-tone, serve to reverse the direction in which the steam flows through the engine. In the case of the compound, when the handle is in the vertical position the steam is shut off; when moved for the forward motion a by-pass admits steam to the intermediate receiver first, and a further motion cuts off this passage and opens steam to the



The Sweet Engine

high pressure cylinder, and from the receiver to the low pressure. Hence, if the high pressure is on the dead center the steam from the intermediate receiver will start the engine. When in the full forward motion the steam and exhaust pass straight through the two plug valves, but when the valves are turned back about one-quarter turn

the high pressure steam is led through small channels to both the high pressure exhaust chamber and the receiver, and through the low pressure exhaust chamber also; thus making both cylinders high pressure for backing, but by the contracted passages the engine cannot back



Sectional Views of the Sweet Engine

fast. When backing, the exhaust from the high pressure passes out through the end of the valve.

This engine was designed by John E. Sweet, for parties in Syracuse, N. Y., and built at the works of the Straight Line Engine Company, of that city.

## A New Motive Power—and What Became of It

BY I. B. RICH

I WAS sitting in my office, in Philadelphia, the other day, dictating answers to a pile of letters that had arrived in the morning mail, when the boy brought in a somewhat dilapidated card bearing the name of Charles Hopewell, Jersey City, Automobile Expert.

What he wanted of me was a mystery. True, I'm a member of a club in town, have a couple of carriages of different makes, but I didn't suppose I was conspicuous enough to be selected as a victim of an expert. If his card was a fair sample of the man, he was a genius.

"Show him in, Jimmy," and to my stenographer—"I'll finish dictating a little later."

Mr. Hopewell was a queer looking genius, but you couldn't help being interested in his talk. He had a new motor vehicle, and had just run it over from Jersey City. Made good time of course—they all do—and wanted me to see it and ride in it. Knew I was a careful man; quite a mechanic; wanted my opinion, and a lot of other flattery. But he said it as though he meant it, and I began to believe myself. Queer how easily we fall in with other people's ideas when they are favorable to ourselves.

He urged so persistently and flattered so artistically that I finally agreed to go out for a run in the park at 2, and then I tackled the correspondence again with renewed energy, but I kept thinking of his conversation and wondering what the machine could be like. When I asked him the motive power he only smiled and said it wasn't gasoline, or steam or electricity, or even liquid air. What under the sun was it?

Promptly at 2 o'clock a bell announced his arrival, and I went out to see him and the machine, principally the latter.

It was a small wheel, low hung body affair—not particularly handsome and yet it had a business like air about it that I rather liked. But the motor and the motive power. Whatever it was, it was all enclosed, together with the motor, and there didn't seem to be any chance for dust to get at the machinery. As that has been a hobby of mine for some time, I liked it better than ever.

Well, I stepped into the machine and tried to note the surroundings. He had a wheel-steer device, but with a small handle projecting from the rim, like the handle of a piece of machinery. This indicated when the wheels were straight, and also gave a handle for a quick revolution of the hand wheel when necessary. Another hobby of mine, so the machine increased still more in my estimation.

To start, he pressed a button with his foot, and with a slight kick the motor started with very little noise. On the steering wheel was a dial marked from zero up to sixty, and as this was stamped "miles" I asked if it meant speed or distance.

"Speed, Mr. Rich. I'll put that at about ten, and then handle her by the clutch till we get out of the crowd. This lever throws in the clutch this way and pulling it back applies the brake. Backing? Oh, yes. Moving this same lever sideways gives the reverse. Don't often want it, but when you do it's handy."

We were moving now—crawling along behind a trolley here, shooting through an opening there, and his handling proclaimed him an expert driver better than anything else could have done. But what was the motive power. There was no smell of oil, no steam, no ammeter or volt meter. Only the steady quiet throb of the engine, running something like a gasoline engine, but more quietly than mine did. I gave it up, so I finally asked him again, what made it go.

We were entering the park by this time, and as the roads were fine and almost deserted he had plenty of time to explain things.

"Well, here's what makes it go," he said, as he raised the seat curtain and displayed a large tank with a glass front, filled with what appeared to be homeopathic pills.

"Didn't know you were a doctor, Mr. Hopewell," I replied. "Now, joking aside, what makes this thing go? It goes better than anything I ever rode, but I want to know what makes it; no more joking please—I want facts."

"Dead earnest, Mr. Rich, these pills, as you call 'em, make the motor mote." See here, and he uncovered a pipe leading downwards from the tank, "see them feeding down to the motor."

Sure enough, every second stroke a pill dropped down, presumably to the motor, but that didn't explain things for a cent.

"Those pills," he went on—"are dynamite. No, don't try to jump," as he grabbed my coat and forced me to the seat, "they're harmless until they reach the cylinder of the engine. There they do the work, as you see."

"This dial marked miles regulates the number that are fed to the motor per minute, and the motor runs fast or slow in accordance with the number of pills it receives. This tank holds enough for a thousand miles, and can be renewed as safely and as easily as water—when we get our depots established in various cities. But a thousand mile charge gives you a large radius of action, and a mighty small chance of running out without being able to renew.

"Doesn't she work pretty though? Never a miss or a slip. Here you take her now—you can handle her as well as I can. Turn that dial if you want to go faster—there, that's the twenty-five-mile notch now and she's running like a bird. Now what do you think of her?"

What could I say but that it was fine in every way, and how could I refuse to go in on the ground floor when he broached the financial part of the question. Seemed like a chance of a lifetime, and Morgan and Jay Gould began to seem like poor men as compared with what I should be in ten years' time. The outlook was illumined with bond coupons and bullion.

Then he told me of his other plans. How he had been investigating explosions in flour mills and wood finishing establishments, and had discovered how to use flour dust and wood dust instead of dynamite for his motive power.

Ordinarily I should have been skeptical. but hadn't I seen the dynamite pill machine, and why wasn't the other just as feasible? Saw mills and grocery stores began to loom up as the automobile supply houses of the future, and I saw visions of autos driven up to one of them while the operator went in for a bag of flour or a box of sawdust. Then my fortune increased in due proportion, and fleets of private yachts, motor vehicles of all kinds and sizes and other luxuries began to appear as everyday occurrences, and ——

"Isaac, I say, Isaac, you'll be late for the office if you don't get up this very minute—I've called you three times before," and my wife's practical remarks put an end to dreams of fortune and dynamite and flour and sawdust. But it all seemed so real and so feasible that I'm trying to make out whether it was a prophecy or just a plain ordinary nightmare.

## Notes on Heavy Motor Traction

THE question of the application of the self-propelled vehicle to the transportation of heavy loads along common roads is one which of late has been taken up by a number of manufacturers in this country, and in view of this, it seems fitting that we present our readers with a résumé of the recent address of Prof. George Forestier before the Liverpool Self-Propelled Traffic Association on "Heavy Motor Traffic in France."

Prof. Forestier is Inspector-General of Roads and Bridges in France, and while his remarks refer particularly to conditions as they exist in that country, nevertheless some of his deductions are just as applicable in our own land, and it is hoped his address will contain much that will be valuable to American manufacturers.

In his opening remarks the speaker referred to the varying conditions found in roads, calling attention to the fact, that in order to meet and overcome these, the motor used should be of sufficient power to overcome the resistance which the most hilly part of the road will present on that day when the road is in its worst state, unless on that particular day the useful load can be reduced without inconvenience.

Regarding fuel, it was the opinion of the Professor that liquid fuel was the ideal. He gave as reasons for this the great saving in weight and the dispensation of a stoker.

Where he compares motor-driven vehicles with horses, it is perhaps better that we give his own words:

### COMPARISON WITH HORSES.

"Let us compare, now, the cost of transport by automobile with that by means of horses.

"In France, we reckon that a horse can go at a pace of from 2.25 to 2.5 miles an hour, giving a tractive pull of 0.13 of its weight, for a day of from eight to nine hours, and that on a well-paved or even macadamized road on a fine day the rolling resistance is less than 44 pounds per ton. A cart for two horses weighs 12 cwts., and the two horses, weighing together one ton, can thus give an effort of 291 pounds, corresponding to a load of 6.6 tons on the level. If one takes hills and the tare of the vehicle into account, the load must be reduced to 3.0 tons, which, for twenty miles per day, equals sixty net ton miles. Besides, the driver of this team has to be paid, the team fed, and the

vehicle repaired, and this equals 12s. 6d. (\$3.00) per day, that is to say, 2.5 pence per net ton mile.

"As horse haulage can take the goods from the sender to the consignee quite as well as automobile traction can in fine weather or on a paved road, it is not threatened by mechanical haulage for any traffic where a higher speed than 2.5 miles an hour is not required. In winter, master carters can vary their teams according to the state of the roads, but in mechanical traction one can only reduce the load and speed. Accordingly, it is very desirable that our constructors should carefully study the conditions by which they can reduce their prices, still much too high in consequence of the unnecessary provision made for speed, which is of no actual use to them commercially."

In regard to the question of road maintenance he remarked that the mutual action of roads and motor vehicles ought to be studied by both paved and metaled roads, as there is some difference between them. We quote :

"Contrary to what we have said of the individual resistance of the sets which constitute a paved road, metaled roads are composed of materials of small dimensions which are only able to resist the weight of heavy motor traffic by mutually helping one another. Again, the foundation and top layers together form a thickness or depth which is oftener than not insufficient to prevent the subsoil from having to bear so heavy a pressure that it gets out of shape. In normal weather, metaled roads are almost as firm as paved roads, and the resistance to rolling is about equal on the two. Unfortunately, when rain has fallen for several days, the binding material loses all cohesion, and the road becomes a mass of movable stones, which slip about more and more easily under the pressure of heavily-burdened wheels as the speed increases. At the same time the depth of the road, already too small and still further reduced by the displacement of some of the stones, transmits to the subsoil a pressure too great for its stability, and it gives way. When this is the case the road continually presents an inclined plane in front of the driving wheels, and this largely increases the rolling resistance, and, at the same time, adds considerable friction between the sides of the felloes and the depressions that are made. All engineers responsible for roads have agreed that during the rainy season the rolling resistance may be treble what it is during fine weather. This is one of the most unfavorable conditions for mechanical propulsion, for it necessitates the motors not only being capable of a single maximum effort but of a continual one, which

may be three times greater in wet weather than in fine, unless one is content to diminish the speed.

"The remedy for this state of things depends, as we have seen in the case of paved roads, on proper maintenance and on the motor vehicle builder. In the first place, the depth of the road should be increased, it should be kept clear of all excess of detritus which might increase the state of mobility of the material, and the subsoil should be drained in order to prevent its giving way under the load. In the second place, the weight supported by the motor wheels should be diminished, and the latter should be given a width of tire in harmony with the compressibility of the road.

"Very wide tires should be used on soft ground, as experience has proved in the case of steam ploughing engines. It is only under these conditions that the soft earth will stand the engine's combined driving action and weight when going round curves. On the contrary, if the soil is as resisting and hard as a stone road in good weather, curves make no difference, and the tires obtain their full adhesion. For the motor wagons with which we have to deal, it is necessary then to have two sets of wheels—one with very wide tires for winter, during which the road material is easily disturbed; the other with narrower tires for summer when the material is very coherent."



## Dick Turpins Awheel.

BY PERCIE W. HART.

“ON the first of each month I use my gasoline automobile to take the money for the payroll over to the Ellendale mines. It's a trifle more than twenty miles, and a poor road through wild hilly country, but I always enjoy the little trip.”

Such was an innocent remark of mine, made while dining with some friends at a public restaurant, during a visit to Chicago. That some person who overheard me deemed the information of value would seem to be proved in the sequel.

On the first day of the following month, I started forth as usual from my native town, with the payroll money in a hand satchel upon the seat beside me. It was a fine morning, clear, and just warm enough to be pleasant. Everything seemed to promise a most enjoyable ride. My runabout was of rather primitive model, one of the first types of gasoline automobiles introduced in America, consequently very heavy and incapable of such speed as the later developments. But, nevertheless, it was quite fast enough for comfortable riding over the rough country roads of our district, and I had become so well accustomed to handling the machine that I could do almost anything with it. For the first few miles after leaving home I sped along pretty briskly, but just before entering the wild and lonely region which I had to traverse, I stopped to exchange a few words with an old friend of the family, who was at work in a field at one side of the highway.

“Much travel along here this morning?” I happened to inquire, after some little interchange of views on crops and national affairs.

The old farmer had left his plow and team of horses standing in the furrows, and was leaning against the snake fence. He pursed his lips at my question, and looking rather disdainfully at my halted vehicle, said: “Only a couple more like yourself that be'ant satisfied with the Almighty's gift of animal critters to mankind.”

“What, automobilists?” I queried eagerly, for I was alone in the sport in our country.

“Naw, but two city fellows on their bi-cyc-kels,” growled the old man uncompromisingly. “They scooted past here more than an hour ago, with their backs hunched up like a kickin' steer. Reckon

you won't catch up with them this side o' Ellendale, 'cept you put on steam enough to bust your biler."

A few moments later I bade good-bye to the old farmer and started off without giving a second thought to the cyclists that he had mentioned as preceding me. For the next ten miles or so my route lay through the hilly and deserted section which I have mentioned. Just about the middle of it the way led along the bottom of a winding, wooded ravine. Upon either hand rose nearly perpendicular banks, masked by an impenetrable growth of stubby fir trees. Along both margins of the road lay many good-sized rocks which had been removed in the making; but the space between was wide enough to allow two vehicles to pass abreast. At this season of the year, the sandy soil, of which the highway was composed, was dry and hard. The section over which I had been journeying was extremely rough and hilly, so when I came to the ravine I was glad enough to put my speed-changing gear to its highest limit, and commenced to run along at a good pace. Suddenly, as I turned a sharp bend, I came upon a bicyclist. He was a short, stocky fellow, clad in a blue riding suit. He stood on one margin of the road beside his wheel, and was running his fingers about the machine, in a listless sort of fashion. I brought my automobile to a halt a few paces ahead of where he stood, and, turning in my seat, addressed him:

"Anything the matter?" I queried.

He replied with a negative shake of the head, and did not even raise his eyes to mine.

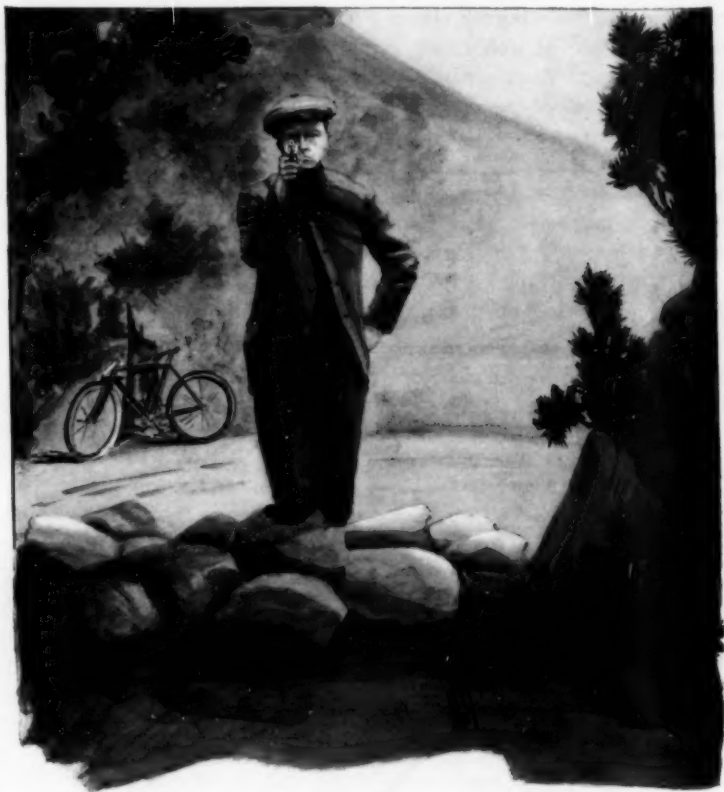
"I thought your wheel had gotten out of order and that perhaps I might be of some assistance," I went on.

Still he made no verbal answer, and apparently gave no heed to my presence. Unwilling to intrude where I was evidently not wanted I started my runabout and proceeded onward. I had scarcely gone a hundred feet when I heard a shrill whistle. It seemed to come from behind me, and I did not doubt but what it was produced by the lips of the taciturn cyclist. But when I turned in my seat and looked back he was still standing in the same idle fashion, with his whole attention seemingly absorbed upon the fittings of his wheel.

"May be some lunatic escaped from an asylum," I muttered to myself; "he certainly doesn't act like a sane person." And, as I continued to speed along I could not help smiling at the idle fancy.

The windings of the road made me quickly lose sight of the oddly behaving stranger, and I had just dismissed him from my mind as an

unimportant incident, when something that I saw right ahead caused me to gasp and stare in astonishment. This was nothing more nor less than a low barricade of loose stones piled directly across the road. It was low, as I have said, but, nevertheless, I could not hope to leap it with my clumsy vehicle. The whole thing happened very quickly



"Stand and deliver," he cried fiercely. See next page

and I had scant time for reflection. Just as my hands clutched at the brake and stopping levers the figure of another cyclist, clad in brown, arose from behind the barricade, and I could see his wheel, leaning against an adjacent stump.

"Stand and deliver," he cried fiercely, at the same time pointing a revolver at me.

Quick as lightning their purpose flashed through my head. They were after the payroll money in the satchel alongside of me. The mute-mouthed rascal whom I had just passed had signalled my approach to his confederate. With no thought of any such contingency in our law-abiding country I carried no weapon, not even so much as a club. I would be practically helpless if they once got hold of me, and the villains probably knew this as well as I did. By erecting the barricade they expected to bring me to an abrupt halt, and so secure both my person and the treasure before I had time to attempt an escape.

"We don't want to kill you, but we mean to have that bag you've got on the seat and your automobile, as well," called out the armed cyclist; "so better give up easily and save trouble."

I was still rattling on toward him, and had approached within a short distance while he was speaking. Just as he finished I gave two quick twirls on the steering gear, the auto swung around on two wheels, very nearly capsized, and then sped back over the road I had come.

"Good-bye," I yelled derisively, at the same time dodging down low, with the hope of avoiding any flying bullets that might ensue.

But the highwayman did not fire. He merely gave vent to a sardonic laugh, that echoed back and forward from the narrow banks of the lonely vale. It did not take many seconds for me to comprehend the reason for his hilarity. Scarcely had I gotten out of sight and turned another bend, when I came upon the whilom listless and sulky blue-suited cyclist engaged in piling up another stony barricade. He had it nearly completed, and must have started to work the moment I had gotten out of sight.

"Stand and deliver," he called, after the same fashion as his compatriot, and emphasizing the request in like martial style.

Although his barricade was not so high as the other one, I saw at a glance that it would be no use to try to force my way over the thing. So I repeated my first manœuvre, swinging the auto quickly, and scuttling forward again.

"This is a mess, and no mistake about it," I said to myself, with a quick glance about. "They've got me corralled, for I can't get out at either of the sides. They've won the first trick, I guess, but I'll see if I can't trump in on their long suit."

Even while so muttering I had slowed down speed, and now, for the moment out of sight of both of the miscreants, allowed a goodly portion of the gasoline in the supply tank to run on the road.

"Now," I commented, "unless I am greatly mistaken, there is just enough fuel left to bring them to Hightown, not a hundred yards further, anyway."

Once more I turned the bend and found the brown-suited cyclist still on the alert. I brought my runabout close up to the barricade, came to a full stop, and jumped out, leaving the precious satchel upon the seat.

"I surrender to your combination of overwhelming force and superior strategy," I remarked, as nonchalantly as possible.

Still keeping a wary eye upon me, the modern highwayman gave a shrill whistle as a signal to his companion at the other end of the trap, and then addressed me as follows: "Sorry to bother you, but it's all in a day's work. Just stroll back a little piece, sit down on the edge of the road, and keep quiet. That's all you've got to do. We won't hurt a hair of your head if we can help it. Won't even bind you. And, perhaps, if you're real good we may leave your automobile to be called for somewhere, and nothing to pay on it but a little storage. It all depends upon how quiet you keep. So take my advice and make the best of being held up, and say no more than you can possibly help to anybody."

All the while he thus chatted the villain held his revolver in a handy position for immediate use. I made no protest, but obeyed his instructions so far as taking a seat upon the shelving bank was concerned. By this time the other desperado came along the road, pushing his bicycle with one hand. He gave me a queer sort of a grin in passing, but said nothing.

"Now, partner, throw that wheel anywhere you like and clear away the wall:" cried the brown-suited one, who seemed to be the leader, as he certainly was the more talkative of the pair. "I'll keep my eye on this gentleman."

The other did as he was bid, and set to work removing the barricade. This did not take long. When he had finished, and the two men were just about to clamber aboard the captured automobile, the taciturn fellow suddenly bellowed: "Hey! Ain't we forgetting something. Can't carry our bicycles with us, but we shouldn't leave them handy for him."

"By Jove! I nearly forgot all about that," ejaculated his companion savagely. "I'll fix them."

And striding over to where the two wheels lay, he picked up a big rock and proceeded to smash their parts with considerable energy.

"Bye-bye," he sang out, as he next proceeded to follow his companion aboard of my runabout.

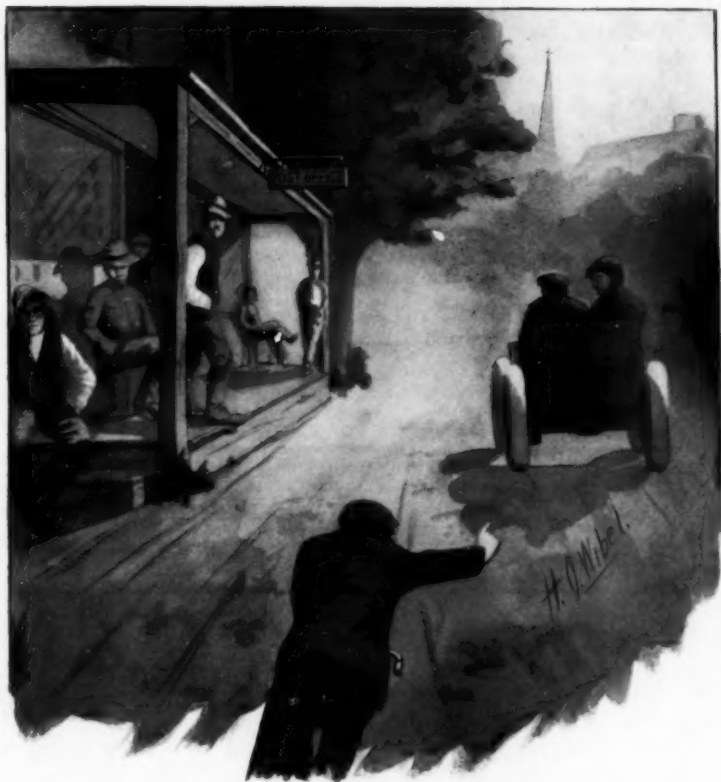
The pair showed an intimate knowledge of the working of an automobile, and started away almost immediately. In a few seconds more they had vanished around a bend.

"Now what can I do to thwart their escape with the payroll money and my runabout," I said to myself. "There is only the one road for them to take as far as Hightown, and the fuel I left will last no further. They must make a stop there. All depends upon whether I can reach there before they can procure a fresh supply of gasoline."

But I well knew that I could not do this on foot, and no horse or other means of quick transport was available this side of the spot that I had succeeded in making their temporary destination. Then an idea flashed through my mind, and I leaped toward the two shattered bicycles of the highwaymen. I first scanned them rather despairingly, and then set to work with a cautious whoop of joy. The destruction was not quite so bad as the rock-smasher had imagined. Of course neither of the wheels was capable of being ridden the way he had left it, but then I had the more or less unshattered parts of the two to select from. I found a wrench in one of the tool bags, and a screw driver in the other. The way that nuts, bolts, handlebars, and other parts flew around in the next five minutes, was a caution to all repair shops. A wheel from one, a sprocket from the other, and back to the first for a saddle, and so it went. I don't mind saying that in a perfectly sane mood I would never have dared to ride the hastily thrown together and rickety combination which I was now effecting. But I must have been temporarily insane; wild with excitement and the desire to forestall the villain's clever game. At length the wheel was complete, so far as I could see, and throwing myself upon it, I pedaled recklessly after the captors of my automobile.

I will not attempt to describe that ride in detail. In fact, I can scarcely recall its incidents. A confused memory of vigorous pedaling, an unsteady seat on the ill-adjusted saddle, a hard matter of steering with wheels far out of true, and an ominous creaking and groaning from the scantily spoked rims. But above all was the pedal-

ing, the driving that wretched machine up and down grade, regardless of safety or anything else. Then there was the delicious moment, when I first sighted the fleeing riders in my automobile. We were nearing Hightown then, and they knew better than to fire their revolvers. They evidently trusted to outspeed me, and all other pur-



"Arrest those men," I cried. See page 158

suit. They little suspected that I had tampered with their fuel supply, and that their course was nearly run. But they realized it all of a sudden, when just in front of the Post Office, with its crowd of open-mouthed loafers standing round. The automobile gave a few gasps

and slackened speed, until it stopped. I was upon them before they could move from their seat.

"Arrest those men," I cried to the crowd, who knew me well, just as the bicycle upon which I was riding sank to the ground in flying fragments.

"Gentlemen," I remarked to the scowling pair, as the sturdy farmers flocked about, "it's my turn now."

And so it was.



## The Waywardness of One Machine

BY W. E. S.

I'M not much of a believer in luck or fate, but my experience with one of my carriages came near making a convert of me. I had decided on the machine I wanted, and went to the factory to see it and try it.

Arriving in the town of W—— on a Wednesday morning, I made my way to the factory and found the machine ready for trial. Having been disappointed once I intended to give this vehicle a good trial, and so informed the manager, who was glad to have me do as I pleased with it. So they fixed up the machine, and I started in to test it.

The pavements of W—— are none too good. I found cobbles, poor Belgian block, dirt, and all having a liberal supply of gutters and manholes, none of which were conducive to easy riding, or good for weak springs. For three days I drove that machine around the town and out on the country roads in no careful manner. It's a wonder I wasn't arrested for fast driving, for the way I ran over those streets, striking manholes, car tracks, etc., was almost enough to rouse a country policeman to anger, but I was unmolested.

Everything went splendidly. I never saw a machine run nicer, or more steadfastly in its absolute refusal to break or give out at a single point. I was delighted, so was the manager, especially when on Saturday morning I handed him my check and became the proud possessor of a machine that had defied my efforts to smash it. Now I should try to prevent a break as carefully as I had been eager to make one before.

Well, I started for Boston on Saturday morning, accompanied by the aforementioned manager, on a hot August day. We had possibly gone a mile from the factory when my steam dropped and I discovered my fire was out. It was the first time it had shown a desire to quit business, except when deprived of its supply of oil. Fortunately, we were near a store with a telephone, so the foreman was sent for and he came flying after us on his wheel, he looked the burner over, couldn't see anything wrong, lit it without difficulty, and steam came up promptly. I wanted him to stay with us a while and watch it, but they were busy in the shop, and, as everything appeared to be going right, he left us to our cruel fate and returned to the factory.

We had gone possibly two miles further when, without apparent cause or warning, the burner again went out of commission. No telephone near us now. Thermometer ninety-eight in the shade, no telling how much in the sun, and no shade near. We finally scared up a boy with a bicycle whom we chartered to go to the factory after John and then followed a sizzling hot hour when an umbrella, a fan and a glass of lemonade would have seemed as a gift from heaven. John had trouble starting the fire this time, but finally got it going, and then took his place beside me, as I insisted he should accompany me to Boston. The manager used the wheel to the nearest station, and went in by train.

The burner gave no more trouble, but before we had gone five miles we discovered a trail of water behind us, which, though it laid the dust, lessened the capacity of our tank, and made frequent stops for water necessary. The tank had sprung a leak near the top and demanded attention.

We reached Boston, however, after numerous delays for water, only to be informed that the tank couldn't be soldered before morning.

Eight o'clock saw us all gathered at the storage house, and from that time until one we worked on that tank, getting everything in shape, and starting for Providence after a not very elaborate dinner.

Well, to make a long story short, we got there after several delays, due to the tank leaking. It is only fair to say that the engine always worked perfectly. The burner was a constant source of trouble, as well as the water tank. My chief mistake, however, was in having rigid wooden wheel construction and solid rubber tires.

But it will always remain a mystery to me why I could not break the carriage while it was near the sheltering wings of the factory, and a greater mystery why I could do nothing else but break it when I had it away from the factory.

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A letter received from Prof. Geo. S. Atwood, of Berlin, Germany, mentions that it is wondered at by many that more American firms are not represented at the Permanent Automobile Exhibition, now open in his city. This exposition is constantly open, and no admission fee is charged. A number of sales have resulted from visits paid to this exhibition.

## Of Passing Interest.

*(Readers will confer a favor upon the editors of this magazine by sending in any interesting item of news suitable for this department.)*

While a representative of this paper was discussing with a well known automobilist of this city, a few days ago, as to the French and American makers of racing automobiles, our chauffeur referred to the French as having more correct ideas regarding the construction of fast automobiles than our own builders. It is a fact, that almost all racing vehicles built on the other side possess a decided advantage, in that they are made with a sloping dashboard, instead of one of vertical shape. A vertical front offers the largest resistance to the atmosphere. In the case of a sloping front the pressure acts along the line followed by the car, while, owing to the direction of slope, the tendency is to press the car heavily downward.

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The Automobile Club of San Francisco has completed arrangements for leasing the building at present occupied by the Mercantile Library. It is intended that the ground floor will be used for the accommodation of vehicles of members.

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While there may be some misgivings as to the men who will handle the motor vehicle delivery wagons, there is another feature which will largely counteract it. This is the presence of the "automobile machinist" in every stable, whose duty it will be to see that everything is right, and to make such repairs as are necessary. The drivers will also report on any defects, and be taught, as far as possible, to remedy any defects which come to light on the road.

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There are but few persons who, when they first undertake to operate an automobile, are not liable to become confused when meeting passing teams. Some operators have suggested, that if drivers of teams would pay more attention to their horses when passing horseless vehicles, and less to the automobile, there would be fewer runaways and resultant accidents.

This sounds all right, but perhaps it is a rule which works both

ways, and the first experiences of many drivers of automobiles would lead to the opinion that they too would do well to attend more closely to their machines and less to passing teams.

Another thing which is very funny, but nevertheless true, is that when the beginner makes up his mind as to how to steer clear of certain passing teams, he is more than likely to make straight for that team. It was the same when the wheel was first tackled by the average rider. This is a strange thing, but it is certainly true. Keep yourself under control is the safest way of keeping your machine under control. Accidents do happen, but in many instances they arise, not so much from the derangement of the mechanism as from the operator allowing his mind to become deranged.

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A friend went on a run recently and forgot his funnel for filling his gasoline tank. Finding a quart bottle with a small neck he promptly scored it around near the base with a file, struck it a sharp blow on a stone, and had a good funnel in short order. It's best not to forget appliances likely to be needed, but an ingenious person usually finds a way out of minor difficulties.

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William Esty, of Laconia, N. H., is making a new wheel which has a number of new features, which has all the load-sustaining qualities of the wood wheel, while the wire spokes with which it is fitted and which are tangent to the hub, give it all the tension-resisting qualities of the wire suspension wheel. In this wheel wooden spokes are used.

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The Automobile Club of France has decided to hold an International Exposition of automobiles from the 21st of January until February 10, 1901.

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The new automobile omnibus service between the National Palace and the Statue of Carlo, in the City of Mexico, was subjected to a severe test on the 2d and 3d of December last, which was very satisfactory.

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One of the early novelties of the twentieth century will be the "Automobile School for Women" to be opened in Chicago in a few weeks. It is intended for the instruction of women in the management of their horseless carriages.

## Notes from Abroad

There were no less than seven Locomobiles entered and run in the recent anniversary run of the Automobile Club of Great Britain to Southsea. This speaks well for American enterprise.

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The Italian Touring Club proposes to have a tour in 1901, when the automobile clubs of Venice, Bologna, Padua, Florence and Feirara will probably be represented. It will occupy about two weeks, and will be through Milan, Novara, Turin, Pisa and Leghorn.

The tour will end at Milan, where an exhibition will be held. Foreigners are welcome to have a part in this tour and it is hoped Americans will try and so arrange matters as to be able to be present. The plan now is to hold this tour some time between April 21 and May May 22 or 23, a time when the presence of American visitors to Europe is quite pronounced.

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The Automobile Club of France is constantly growing in membership. The total now reaches the large number of 2,389.

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A recent trip over the Alps undertaken by Lieutenant Engler, of Frankfort-on-Main, is illustrative of the ability of the motor carriage to stand up to heavy service. He, accompanied by his wife, started from Stuttgart through Ulm, Frankfort, Walchensea, whence the vehicle crossed the Karwendel mountain, which reaches a height of 33,000 feet, and proceeded to Innisbruck in Tyrol. From there they went over the Brenner Pass to Venice in Italy. The journey was 1,200 miles long. An average speed of thirteen miles an hour was maintained. The Tonal Pass is very steep, but the vehicle surmounted all difficulties very satisfactorily.

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The Association Philotechnique, of Paris, has established a Professorship of Automobilmism.

## Casting by The Tropenas Process

THERE are, doubtless, many of our readers to whom a few facts concerning what is known as the Tropenas Process of making small castings will be very acceptable. This process consists in the use of special converters in which pig-iron and selected scraps, previously melted in a cupola, are subjected to an air blast of 3 to 4 pounds pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig-iron, and, after a period varying from 16 to 20 minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro manganese or ferro silicon, or both, to bring up the silicon, manganese and carbon contents to the specified proportions, when the metal is drawn off into a ladle and poured. The process is very simple, and the product very regular.

The peculiar advantage of this process lies in the fact that the resultant metal is much better, and, consequently, more fluid than that produced by any other method, and it is this fact which makes it valuable in the manufacture of small and intricate castings, as it can be poured over the lip of the ladle in as small a stream as desired, and will run through thin sections, producing solid castings free from pinholes and cracks.

Any grade of metal is readily produced by varying additions, and is consequently valuable, not only in the production of low carbon steel of the maximum permeability, so much desired in electrical castings, but also in the production of special grades of hard steel for mining machinery parts, and other purposes.

In March, 1900, the Sargent Co., of Chicago, commenced, after a careful study of steel making, the making of small castings by this process. This plant has proved to be entirely successful, and produces from 20 to 30 tons of castings per day. These castings are sound and solid, and have specially smooth surfaces. All classes of general machinery, railroad, mining and electrical castings are turned out by the company.

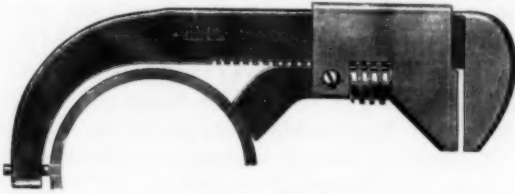
Miscellaneous castings, unless otherwise specified, are made of mild steel, and have a trusted strength of from 65,000 to 75,000 pounds, with an elongation of from 20 to 30 per cent.

Castings, as made by this process, are true to pattern, and can be furnished in much less time and at low cost. Small castings, used in in automobile construction where lightness and strength are desired, can be made by this process equal in all respects to forgings.

## A Combination Wrench

**N**O automobile is complete unless it carries a full complement of tools, and no set of tools seems to be complete unless it includes the familiar adjustable wrench. Of course, if one so chooses, he can carry a number of wrenches of different sizes, but after all it is really wonderful in how many ways the adjustable wrench helps one out.

These tools are made in a large variety of styles, each claiming



A handy wrench.

some merit, and doubtless they possess it, but for an all round, handy, neat and serviceable wrench, attention is called to the one shown in the accompanying illustration. It is rigidly made from the best material, and the workmanship is of the very finest. It will be seen that in addition to being used as a wrench it can also take the place of a spanner. Its range of action, both as wrench and spanner is quite large, and altogether the tool is admirably fitted to the wants of automobilists generally. It is made by Frederick Schrader, Bridgeport, Conn.

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Pettingill & Co., the well-known advertising agents, of Boston and New York, have just issued a neatly gotten-up book, entitled "The Science of Advertising." The book is written in a highly interesting manner and contains a number of very pithy suggestions, and we advise those interested in the subject to obtain a copy. It contains 14 pages and is bound in cloth.

## Carriage of Explosives on Ferryboats

THE question of allowing automobiles to make use of the ferryboats is one which has been referred to quite often of late.

Now that the Automobile Club of America has taken definite steps to have a change made in a statute which is both absurd and unreasonable, it is fitting that a few facts concerning what has been done by the club should be disclosed.

The committee which laid the matter before the Treasury Department was composed of George F. Chamberlin and Richard L. Sweezy.

After these gentlemen had presented their argument in favor of a revision of the statute they were answered by a reaffirmation of the ruling previously rendered, namely, the prohibition of gasoline, naphtha and other explosives being carried on ferryboats. As a result of this interview the club committee was advised to appeal to the courts.

It is true that in some instances careless operators will lose their heads, and as a result may cause serious injury, yet we think that in most cases the owners of automobiles are level headed men and women and would be likely to take all necessary precautions to avert any accident.

We hear much about the accidents which happen in connection with automobiles, but as a matter of fact, when sifted down, we think it will be found that the number of accidents are relatively small when compared with those caused by other modes of conveyance. Whenever an automobile breaks down or meets with any mishap whatever, people point the finger of derision and look upon the "new-fangled notion" as a dangerous toy. This is natural, and every new thing, especially when it is so applicable to every-day uses as is the automobile, is apt to be hurt by unwise dabbling on the part of some.

To operate an automobile successfully requires a good deal of common sense, notwithstanding the statement made by some makers that their vehicles can be run by a child.

Of course it is to be supposed that there will be some who will needlessly expose their explosive liquid, used either as fuel or as motive power. Yet it does not seem just proper that all should suffer on this account. There is to-day a great quantity of such explosives carried on our ferryboats, and this wholesale discrimination against automobilists does not appear to be fair at all.

It is to be hoped that all the clubs, as well as the Automobile Club of America, will take this matter up and fight it to a finish.

## The Dream of the Scorchers

"Bring forth the car!" The car was brought,  
In truth it was a noble steed—  
A racer of the get-there breed;  
It looked as though the speed of thought  
Were in his wheels—gee, what a game!  
I ne'er before had seen the same.  
Up in the seat swift I jumped,  
And with willing hands the levers pumped.  
You should have seen the way I humped  
My back and leaned hard against the steering bars,  
Without one thought of cable cars!  
Away! away! My breath was gone—  
I saw not where I hurried on;  
'Twas scarcely yet the close of day  
As I flew on—away! away!  
My speed was like a mountain blast—  
Great guns! but I was traveling fast!  
Full soon a warning shout arose.  
A lady dressed in Sunday clothes  
Straight in my pathway gently stepped—  
Her relatives, I'm sure have wept  
And mourned her sudden, sad demise—  
A demon's joy shone from my eyes;  
Away! away! my car and I,  
Upon the pinions of the wind,  
All human folk we left behind.  
We sped like meteors thro' the sky—  
A fat policeman barred my way;  
His funeral was, I heard, next day.  
On! on! at lightning speed I sped,  
And stopped not once to count my dead.  
A trolley car my pathway blocked;  
The motorman was sadly shocked  
When I rode up the fender to  
The roof, then down again flew  
Upon my mild, untrammelled way.  
The sky grew dim and dull and gray.  
My victims had no chance to pray.  
I mowed them down to right and left,  
Nor cared how many I bereft  
Of husband, father, brother, wife—  
Ah, me the carnage and the strife

Of wicked wars could not compare  
With my wild ride, for everywhere  
Rose dying cries and wailing moans,  
And piteous pleadings mixed with groans  
That would have made my blood run cold  
Had I but stopped ; but not for gold  
Or precious stones would I have paused  
To note the ravages I caused.  
On ! on ! into the jaws of night  
I rushed and shrieked with wild delight  
To see men start in wild afright  
As down upon them swift I bore  
And left them, weltering in their gore !  
Away ! away ! with fiendish squeal  
I crushed the weak 'neath rubbered wheel,  
I sneered and laughed at maiméd men,  
I drained with glee my awful cup,  
I laughed a chortling laugh—and then  
The pipe went out and I woke up.

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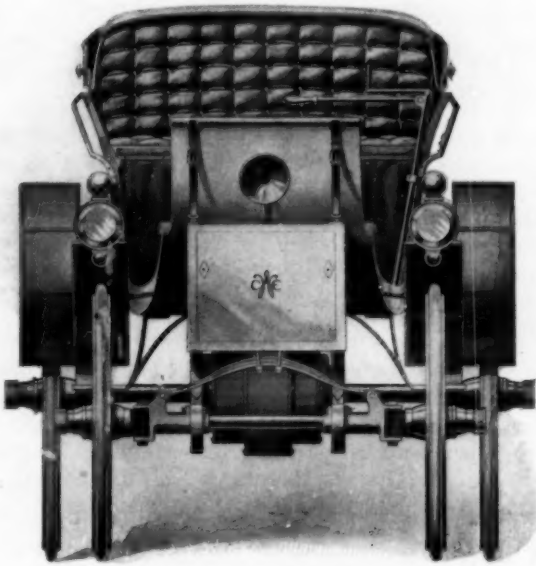
The automobilists of Baltimore are having troubles of their own, so far as can be seen. Not long ago a number of automobile owners in that city wished to test the park rule, which prohibits horseless vehicles in the parks. They ran their machines into the park, and were promptly arrested. The rule states that no vehicle driven by steam or any other system of propulsion with the exception of electricity shall be admitted within the park property. The sole object of the gentlemen who took part in this little act was to test the rule. It is the same old story told over, and it is only by fighting such unreasonable laws that automobilists everywhere will gain those privileges which they are certainly entitled to.



## Woods' Electric Runabout

**I**N our January issue we published an article regarding the new line of electric automobiles turned out by Clinton E. Woods, and this month we are able to present a half-tone showing one of these vehicles. This is an end view of the runabout buggy.

As will be seen by illustration, this carriage is characterized by the



Woods' Runabout Buggy

graceful lines peculiar to the Woods vehicles. It is an exceedingly comfortable carriage, and ample room for two persons is provided by the 37-inch seat. The total weight is but 1,100 pounds, and, it is claimed, it will run forty miles on any hard, level road, and is capable of climbing anything up to a twenty per cent. grade, which is ample for ordinary conditions.

## Ideas of Inventors

*(Copies of patents mentioned herein can be obtained from the Patent Office, Washington, D. C., for 5 cents each.)*

Mr. Richard C. Mudge, of New York, has patented a new form of flue construction for use on steam carriages, whereby the products of combustion are disposed of in a much more satisfactory manner. (Patent No. 658114, September 18, 1900.)

Alfred Boulier and Eugene Boulier, of Neuilly, France, have recently taken out patents for an explosion engine in which two pistons work simultaneously in opposite directions in a single cylinder. A chamber separated from the cylinder contains the mechanism for the admission and escape of gases. (Patent No. 661409, November 6, 1900.)

A patent was recently issued on a sled in which it would seem as though it was questionable whether the device, as shown by patent, would prove practicable. It consists of a regular carriage body containing motor with runners placed in front where front wheels are usually found. In the rear a drum provided with spiral flanges runs in journals, the drums being operated by connections made with motor carried in rear of sled. (Patent No. 661427, November 6, 1900.)

A running gear for motor vehicles has just been patented by John W. Eisenhuth, of New York. It consists of a frame joining front and rear wheels with guiding wheels pivotally mounted upon it, together with a power shaft running longitudinally. Pinions are used for driving the rear wheels of vehicle. (Patent No. 661210, November 6, 1900.)

Frank Lamkin, of Norwalk, O., has recently taken out patents for a gear case for motor wheels. This comprises a casing for exposed parts of the driving mechanism. It is made fast to the body of carriage at one end and at the other to the rear axle. Patent No. 661,583. Filed Sept. 17, 1900.

John I. Thornycroft, of London, England, well known as the designer of water heater boilers, has just taken out patents for a motor vehicle for heavy loads in which all the working parts are placed below the platform. Double reduction spur gearing is used to transmit power from engine to driving axle. Patent No. 662,206.

John G. McPherson, of Philadelphia, has just taken out a patent on a controlling mechanism for automobiles, in which is a central shaft which carries a clutch which in turn is operated by a lever, enabling the reverse to be made without affecting the engine. Patent No. 661,543. Filed June 25, 1900.

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John B. Walker, of Irvington, N. Y., recently took out a patent for a vaporizer for automobile boilers for supplying liquid fuel to steam boilers. Patent No. 661,651. Filed March 3, 1900.

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Patent for a carbureter has just been issued to Thomas B. Jeffery, Chicago, which has two chambers, one for carbureting liquid having an air inlet, the other chamber having an exhaust connection. A partition separates these chambers, which is apertured to afford communication above the liquid level of the first chamber. Patent No. 661,697. Filed Aug. 11, 1899.

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## A Winter Problem

ONE of the difficulties of automobiling in cold weather is the possible freezing of the water in the tanks or pipes. In the steam machine the only way to avoid this would seem to be a thorough lagging of all the parts and of turning steam into the tanks when standing. Long stops, however, almost necessitate a shelter from the cold.

Gasoline machines are, of course, subject to the same disease, but some of the experienced drivers avoid this by using a twenty per cent. solution of glycerine in the tanks instead of clear water. This allows the tanks to be left full and avoids the annoyance of drawing the tank after each run or during a long wait.

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The Long Island Automobile Club will hold a 100-mile trial run about the middle of March. The course will be somewhere on Long Island, probably from Jamaica to Patchogue. The trial will be open to all American-built vehicles, those not especially constructed for racing purposes. A cup will be awarded to the winner, and it is probable that the event will become a regular annual or semi-annual event.

## Alderman McEneaney's Resolution

IT is very doubtful if many of our readers looked with any seriousness upon the resolution which Alderman McEneaney introduced before the Board of Aldermen of New York City recently. He probably never stopped to consider when he brought his resolution before the board referred to, how much the passage of such a resolution would interfere with the operations of numerous businesses.

He proposed an ordinance prohibiting the use of gasoline for any purposes under a penalty of \$25 for each offence. We note that when Mr. McEneaney's plan of action was brought to the attention of those interested it was treated somewhat as a joke, and rightly so. As has been said before in these columns, gasoline is not any more dangerous than kerosene, if properly handled. It is more particularly with the connection this resolution has with automobilists that we have to do. Gasoline machines are plentiful, and most steam vehicles use gasoline as fuel, so it may be safe to assume that such a resolution would touch both steam and gasoline vehicles.

It is, however, not at all probable that such a resolution will ever materialize, and it seems unnecessary for our friends to lay awake at night thinking of the matter.

While it is true that Alderman McEneaney's resolution will probably never become a law, yet it is equally true that, to allay the apprehension of the public as to this dangerous liquid, it might be well if owners of gasoline automobiles would seek to come to some agreement with the law makers.

No law, of course, can be made to reach those whose indifference to the rules of caution leads to disaster. Yet the laws should be reinforced by regulations looking to the sale, and particularly the storing of the fluid. There seems to be no particular obstacle to prevent the carrying out of an adequate law as to storage, which will at the same time permit the easy refilling of the tanks carried on automobiles.

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The recent "End of the Century" race organized by one of our enterprising daily papers, proved quite disastrous to some of the automobiles which entered. Some of the participants had anything but a pleasant time, and certainly did not begin the "New Century" in a satisfactory manner. The whole proceeding smacked of modern journalism, and it was pleasing to note that many of the more representative automobilists of the city were conspicuous by their absence.

## National Association of Automobile Manufacturers

**T**HE Executive Committee of the National Association of Automobile Manufacturers met on January 3, when the following resolutions were adopted:

*Resolved*, That it is the sentiment of this Executive Committee that no exhibits be made in Chicago by manufacturers, except under the auspices of the Chicago Automobile Club; that the time is too short for said club to properly prepare and give a suitable exhibition this year, at a date early enough not to conflict with the Pan-American Exposition at Buffalo, in May; therefore this committee suggests that they would favorably consider a show to be given under the auspices of the Chicago Automobile Club, some time between January 1 and March 1, 1902; and further

*Resolved*, That it is also the sentiment of the members present at this meeting, that every effort should be made by the manufacturers to make as strong a showing as possible at the Pan American Exposition, devoting all their energies to that exhibition rather than to any other show this year, up to the date of the annual show in New York, under the auspices of the Automobile Club of America.

The work the association has set out to perform ought to receive the support of manufacturers everywhere. The show business is being worked to death, there can be no doubt, and it is only by the unifying of action that the tide can be stemmed.

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## New Headquarters of the Automobile Club of America

**T**HE Automobile Club of America is certainly to be congratulated upon its new headquarters, which are in the Plaza Bank building, corner 58th Street and Fifth Avenue.

The whole of the second floor in the building named has been taken. The rooms are beautifully adapted to club purposes, and their open character makes it exceedingly light in day time. The windows are large and on three sides of the building. Access to the rooms can be made either by elevator or stairway.

What impresses one more than anything else is the superb location, giving as it does a fine outlook upon the Park Plaza. It is

doubtful if another place in the city offers such advantages as the one selected. As a prominent member of the club remarked: "There is enough to keep you interested the whole day long watching the passing throng."

Then again, being so near the Plaza, it affords an exceptionally fine place for the assembling of machines previous to a run. Altogether, the rooms and their arrangement, facilities, and situation are ideal, and we have no doubt all members of the club will enjoy to the full these improved advantages. Credit is due to the members of the House Committee, who have engineered the work of arranging for the club's "New Home."

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## The Automobile Club of Great Britain and Indiscreet Automobile Drivers

WE have referred several times in these columns to the harm sometimes done by automobilists failing to recognize the feelings of drivers of restive horses, and to stop when requested to do so by the police. This indifference has been made so annoying to the English authorities as to lead to a consideration on their part as to whether it would not be wise to compel all motor vehicles to carry a number, whether engaged in public or private service. This is the old story; the great bulk of automobile owners being called upon to suffer because of the indiscretion of a few.

The numbering of private motor carriages would prove almost ruinous to that branch of the motor vehicle industry, as there would be healthy and vigorous protest against the labeling of these carriages.

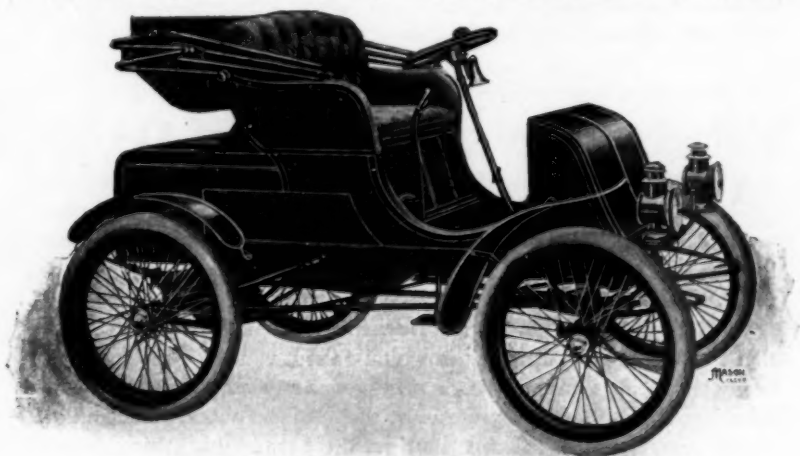
The Automobile Club of Great Britain has taken this matter up, as one of the leading functions of automobile clubs is to foster the automobile industry in all its phases. In order to bring to time offenders in this direction the club referred to has asked the police to give it the names of guilty ones, and if it happens to be a member, that one is liable to be expelled from the club.

This seems to be a very wise stand to take. Automobile drivers would do well to recognize, more than some apparently do, that drivers of horses have rights as well as they. Should automobilists fail to recognize this fact, it cannot but be hurtful to the industry, and that, it seems to us, is not at all desirable for many reasons.

## The New Winton

**I**T gives us much pleasure to present our readers with an illustration and description of the new product of the Winton factory at Cleveland, Ohio. The name of Winton is so closely connected with automobile development in this country as to be somewhat of a household word, and this latest model is fully able to maintain the reputation this company has meritoriously earned in the automobile world.

The new vehicle is a decided improvement on all previous types. The motive power is considerably increased, and is sufficient to warrant



The New Winton

gearing up to much higher speed than was before possible. Instead of using the lever for steering, a wheel is used. This gives a steadiness, a certainty and ease of control, which are very patent to those who operate machines at anything like high speed.

Another new feature is the improved form of muffler used. Instead of being large in diameter and running crosswise, this is made of less diameter and runs lengthwise with the motor, and in such position as not to attract notice. The gearing in the new model has also been incased in such a way as to give absolute protection from dust.

Uniformity in diameter of wheels is another improvement. This

means that it will not be necessary to carry two different sizes of spare tires in case anything should happen which would render any of the tires of no further use.

Direct gearing has been introduced, thus doing away with the countershaft. This lessens the noise, and, altogether, the operation is much more silent than anything yet obtained in a gasoline motor.

Particular attention has been paid to the obtaining of security. Special pains have been taken to insure the securing of parts. Cotter pins have been used freely. The workmanship and quality of material are of the best, and the result of this company's long and varied experience has resulted in placing upon the market a reliable, satisfactory, all-around serviceable motor vehicle, and about which we will probably hear most favorably during the coming season.

## Doings of the Automobile Club of America

A MEETING of the Technical and Contest Committee of the Automobile Club of America was held January 7, in the office of the President, A. R. Shattuck. Other members present besides the President were: Cornelius J. Field, Dr. S. S. Wheeler, Prof. R. H. Thurston, Malcolm W. Ford and A. L. Riker.

The Chairman, Mr. Cornelius J. Field, pointed out particularly that the proposed endurance test, to talk about which the meeting had been convened, must be purely an endurance and not a speed test. In referring to this, he said: "We must prove to the public that an automobile can go a given distance and get there without breaking down, and let the matter of speed take a secondary place."

As a result of the committee's deliberation it was decided to make awards on the following basis:

1. Vehicles making fewest stops *en route*.
2. Vehicles carrying greatest weight in passengers in proportion to their own weight.
3. Vehicles requiring least repairs (if any) and maintaining an average speed of from twelve to fifteen miles an hour.

Stops will be made *en route* for meals and to sleep. It is expected that the average daily travel will be about 100 miles. There will be no special charging stations or depots for fuel along the course, competitors relying entirely for supplies upon the cities and towns through which they pass.

The route will be through Tarrytown, Peekskill, Poughkeepsie,

Albany, Utica, Syracuse and Rochester. Checkers will be stationed at villages *en route* at an average distance of about twenty-five miles apart. The competition will be open to all motor vehicles carrying two persons side by side on one seat.

There will be two classes, one for manufacturers and the other for individual owners. The entry fee to the former will probably be \$100. A prize fund of \$2,500 has been established, and awards may be made both in specie and plate, though this has not been definitely decided upon. The date, also, is yet open, though it is thought conditions will be more favorable in the early autumn than at any other time.

In addition to being an endurance test the run is expected to be viewed as a traveling exhibition. Efforts will be made to secure a very large entry list, so that the showing may be made as impressive as possible.

The meeting of representatives of various automobile clubs also held at Mr. Shattuck's office on the 10th of January for the purpose of discussing the matter of signposts on our country roads was productive of much good, and will result in a very vigorous campaign along the lines suggested. It was attended by delegates from the following automobile clubs: North Jersey, Baltimore, Philadelphia, Westchester, Long Island, Rhode Island, Bridgeport, Massachusetts, Brooklyn, Pennsylvania and New Jersey.

It was decided to begin the crusade by paying attention to the roads between New York and Boston. The signposts to be used are to be made of iron, and will be practically indestructible, similar to those used in France.

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Mr. J. Ransome Bridge, of Boston, President of the Massachusetts Automobile Club, sailed for Europe on the 3d of January. He intends to spend some time over in France, touring in a motor vehicle. Mr. Bridge has already done considerable touring in this country.

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We regret to have to report the death of Mr. J. E. Farwell, of Worcester, Mass. The deceased was an enthusiastic automobilist, and was President of the local club.

## Automobile Club Directory

*Under this heading we shall keep a record of the motor vehicle clubs both of this and other countries, and we hope to have the co-operation of club officers in making it accurate and complete.*

*Corresponding clubs of the Automobile Club of America are designated thus \*.*

Automobile Club of America, Malcolm W. Ford, Secretary, 203 Broadway, New York; representative on International Racing Board, Clarence Grey Dinsmore; Substitute, John H. Flagler.

Automobile Club of New Jersey, Secretary, Dr. H. Power.

Automobile Club of Baltimore, W. W. Donaldson, Secretary, 872 Park Avenue, Baltimore.

Automobile Club of Brooklyn, Secretary, C. Benton Dix, Hotel Clarendon, Brooklyn.

\*Automobile Club of Columbus, O., C. M. Chittenden, Secretary, Broad Street.

Chicago Automobile Club, Secretary, H. M. Brinkerhoff, Monadnock Block, Chicago.

Indiana Automobile Club, Indianapolis, Ind. Secretary, August Kabich.

Long Island Automobile Club, Secretary, Charles W. Spurr, Jr., 552 State Street, Brooklyn.

Automobile Club of New England, Secretary, Geo. E. McQuesten, Brookline, Mass.

\*Cleveland Automobile Club, L. H. Rogers, 357 Amesbury Avenue, Secretary, Cleveland, O.

\*North Jersey Automobile Club, E. T. Bell, Jr., Secretary, Paterson, N. J.

\*Automobile Club of Rochester, Frederick Sager, Secretary, 66 East Avenue, Rochester, N. Y.

Massachusetts Automobile Club, President, J. Ransome Bridge; Treasurer, Conrad J. Rueter; Secretary, L. E. Knott, 16 Ashburton Place, Boston, Mass.

Pennsylvania Automobile Club, Secretary, Henry J. Johnson, 138 No. Broad Street, Philadelphia.

\*Philadelphia Automobile Club, Frank C. Lewin, Secretary, 250 No. Broad Street, Philadelphia, Pa.

Automobile Club of Bridgeport, Secretary, Frank W. Bolande, 208 Barnum Avenue, Bridgeport, Conn.

Rhode Island Automobile Club, Secretary, Frederick C. Fletcher, P. O. Box 1314, Providence, R. I.

San Francisco Automobile Club, B. L. Ryder, Secretary, San Francisco, Cal.

Columbia College Automobile Club, Lewis Iselin, Secretary, Columbia College, New York, N. Y.

\*Buffalo Automobile Club, Secretary, Ellicott Evans, The Lenox, Buffalo, N. Y.

Worcester Automobile Club, Worcester, Mass., President, J. E. Farwell; Vice-President, J. W. Bigelow; Marshal, W. J. H. Nourse; Secretary-Treasurer, H. T. McKnight.

### AUSTRIA.

Budapest—Magyar Automobil Club, 31 Museum Korül.

Innesbruck—Tiroles Automobil Club, Rudolph-Strasse 3.

Prague—Prager Automobil Club.

### BELGIUM.

Antwerp—Automobile Club Anversois, 34 r. Longue de l'Hopital; President, Baron de Bieberstein.

\*Brussels—Automobile Club de Belgique, 14 Pl. Royale; Moto-Club de Belgique, 152 Boul. du Nord; Touring Club de Belgique, 11 r. des Vaniers.

Charleroi—Automobile Club de Charleroi, Hotel de Esperance.

Ghent—Automobile Club de Flandres.

Liege—Automobile Club, Liegeois, 2 r. Hamal.

FRANCE.

Amiens—Automobile Club de Picardie, 36 r. de La Hotoie.

Avignon—Automobile Club de Avignon.

Bordeaux—L'Automobile Bordelais.

Dijon—Automobile Club, Bourguignons Cafe Americaine.

Lyon—Bicycle et Automobile Club de Lyon; Motor Club de Lyon, 3 pl. de la Bouise.

Marseille—Automobile Club de Marseille, 61 r. St. Fereol.

Nance—Automobile Club, Lorrain, Thiers pl.

Nice—Automobile Velo, Club de Nice, 16 r. Chauvain.

\*Paris—Automobile Club of France, 6 pl. de la Concorde; Motr-Club de France; Touring Club de France, 5 r. Coq-Héron.

Pau—Automobile Club, Bearnais Ave. de la Pau, President, M. W. K. Thorn.

Périgueux—Veloce Club, Perigourdin, Hôtel de Commerce.

Toulouse—Automobile Club, Toulousein Café Riche, pl. St. Etienne Société des Chaffeurs du Midi, 25 r. Roquelaine. President, M. Gay.

GERMANY.

Aachen (Aix la Chapelle)—Westdeutscher Automobile Club, Hotel Grand Monarque.

Berlin—Mitteleuropaischer Motor Wagen Verein, I. Universitatstrasse, Herr A. Klose; Deutscher Automobil Club, Liusenstrasse, 43-44.

\*Deutscher Automobil Club, Liusenstrasse, 43-44. President, S. D. Herzog, Victor von Ratilin.

Dresden—Radfahrer-und Automobilisten Vereinigung; Dresdener Touren Club.

Eisenach—Mitteldeutscher Automobil Club; Motorfahrer Club, Eisenach.

Frankfort am Main—Frankfurter Automobil Club, Restaurant Kaiserhof.

Munich—Bayer. Automobil Club, 33 Findling Strasse.

Stettin—Erster Stettiner Bicycle und Automobil Club.

Strassburg—Strassburger Automobil Club.

Stuttgart—Suddeutscher Automobil Club; Wurtembergischer Motor Wagen Verein.

GREAT BRITAIN.

Birmingham—Motor and Cycle Trades Club, Corporation street.

Edinburgh—Scottish Automobile Club.

Liverpool—Liverpool Self-propelled Traffic Association, Colquitt street. Secretary, E. Shrapnell Smith.

\*London—Automobile Club of Great Britain and Ireland, 4 Whitehall Court, S. W. Hon. Secretary, C. Harrington Moore.

Nottingham Automobile Club, Secretary, A. R. Atkey, Nottingham, England.

HOLLAND.

Nimegue—Nederlandsche Automobile Club.

ITALY.

Milan—Club Automobilisti Italiani 6 via Guilini.

\*Turin—Automobile Club d'Italie Via Vittorio Amedeo II, 26.

RUSSIA.

Moscow—Moskauer Automobile Club, Petrowka, Hauschnow.

St. Petersburg—Automobile Club de Russe, President, M. Delorme.

SPAIN.

Madrid—Automobile Club de Madrid.

SWITZERLAND.

\*Geneva—Automobile Club de Suisse, 9 boul. de Theatre.

# THE AUTOMOBILE MAGAZINE

*A Live Journal for all interested in Motor Vehicles*

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## Looking Backward

NOW that our readers have had a chance to get over the end of the century business perhaps it is in order to look back upon what has been accomplished during 1900 in the way of automobile development. Undoubtedly, during the year just closed there has been growth all along the line, and perhaps it is safe to say that American manufacturers have had their share of this.

The exhibitions of 1900 brought to light such varieties of styles as to cause genuine surprise on the part of large numbers of our public, most of whom thought manufacturers generally were confining themselves to one or two styles only.

Manufacturers have been compelled to do much original work. Much money and time have been put into this pioneer work, and it does seem now as though the theorist was fast giving way to the practical man. To be sure the building of automobiles has not arrived

at anything near what it might be, but, nevertheless, much has been accomplished, and there is every reason to look forward to a more successful year's work during 1901 than ever before.

Undoubtedly, the business world is waiting for the commercial wagon, and that the manufacturers are fully aware of this is evidenced by the attention they are giving to this branch of the industry.

### Designing of Carriage Bodies

WHILE, of course, the particular shape given to the body of a horseless vehicle may not affect its running qualities, it is at the same time desirable that in designing the bodies, some effort should be made to have them look in some degree graceful, instead of, as in some instances, such samples of awkwardness and unsymmetry as many are.

The writer was recently conversing with a gentleman who was getting together data to put into a lecture, in which he intended to show the development made in automobile construction from early times up to the present. He showed a few samples of foreign-built machines. What stood out more than anything else was the peculiar and striking variety of shapes given to the bodies. Some of them were practically absurd, possessing almost no gracefulness of outline whatever.

The recent show in New York brought together all varieties of bodies peculiar to this country, and it must be admitted that the difference between them was in some instances very marked.

The possessor of a pair of carriage horses would justly take pride in having a correspondingly graceful and well-proportioned vehicle. Builders of automobiles may harp as much as they like about the perfect running mechanism, the excellently constructed frame and other good qualities of their machines, but a mistake will be made if they fail to give due attention to the designing of their carriage bodies. The average purchaser of an automobile likes a neat and graceful-looking vehicle, and the body presents exceptional facilities for improving the general appearance of any carriage.

On the whole, it is probably true that American makers have not adopted such strange body shapes as have foreign builders, yet there are some vehicles built here which have bodies with most peculiar curves. People do care for appearance, even when it comes to automobiles.



## Operation of Electric Delivery Wagons

By WILLIAM H. MAXWELL, JR.

**T**HERE are not many of us who are now willing to venture the statement that the automobile delivery wagon is not a commercial success. We have a most wholesome respect for the opinion of those shrewd managers of the great business enterprises who have adopted the motor car for their delivery services in almost every large city in the country. Personal experience, and acquaintance in one way or another with the exact facts, show us that these gentlemen are not often misled, nor do they make any investment of an amount equal to that necessary for even one motor delivery wagon for the mere sake of their physical well-being.

In this age, when concentration of energy and specialization of effort mean everything to the proper conduct of any enterprise, it seems that there is a field for a very interesting inquiry as to what methods are employed by these men in reducing the operation of their delivery services to an exact science. First of all a very slight examination of the names of the firms which are using automobiles for the delivery of goods shows that only the most progressive men in each line of business have placed their names on the lists of progress in this direction.

With the gradual introduction of the automobile in the various delivery services in our cities, we come upon the statements of the experiences of those who have tried the motor vehicle for goods delivery. Some are favorable to the automobile; some are not. What do these experiences show? What can they show at the present time? Too careful study cannot be put on the actual results obtained, for probably in the next two years we will form our own opinion of the availability of the motor vehicle for business purposes. That opinion will be moulded by those men who are capable of taking hold of a proposition, of getting from it all the good that can possibly be extracted.

"None are so blind as those who will not see." This is true of the majority of our hard-headed, but often extremely obstinate and self-opinionated business men. Such men usually make use of every

argument they can to excuse themselves from their duty to themselves, and those who are backing them financially, of looking into and examining a proposition as reasonable on its face as is the motor vehicle in a delivery service.

The automobile manufacturer can hardly be blamed for putting a machine into the hands of every applicant who has the funds to make a purchase of a vehicle. He has had a heavy load to carry, and every little assistance counts in such a case. However, many of those who have purchased and used automobiles as adjuncts to their business, because of their unscientific and ill-advised methods, have been, and are, the greatest detriments to the commercial automobile. A man who often will be just on the point of making a purchase will remember that his friend X—— has been operating a delivery wagon for some time past, and he will invariably ask the advice of X—— as to the practicability of the motor vehicle without even considering for one instant the ability of X—— to be a proper judge of anything.

The practicability of any piece of mechanism depends entirely on the care given it. In the case of the electric vehicle, for such is the type of motor power to be considered here, the mechanism needs so little care that the careless person often neglects to give it the little it does require, and then blames the vehicle because satisfaction does not result. Every prosperous railroad, business, or anything else for that matter, which merits and meets with success, is run on a system which more often than not has been reduced to an exact science. Those who expect to obtain results from the use of the motor vehicle in a delivery service must follow the same course. In a large service this means the employment of a competent executive, who is capable of directing the movements of those under him, so as to obtain the best results by giving the vehicles employed proper care and attention. If the service is not large enough to warrant the employment of such a man, the owner himself, for his own interest, should become conversant with the most approved methods of caring for his equipment. This can be done in the case of the electric vehicle, in a comparatively short time.

First of all, in caring for any electric vehicle, use common sense. Don't try to make your apparatus do more than you know it was built to do. Give it care regularly, and, if you haven't the time to do it yourself, hire someone who has.

The most vital part of the electric vehicle, and the portion which needs the greatest amount of care is, of course, the batteries. The type of battery will vary with the vehicle used, but the care to be given

them is, in most cases, the same. The cells usually number either forty, or forty-four, placed in trays of ten each, or eleven each, as the case may be, for ease in handling. In some vehicles, twenty or twenty-two cells are placed in a tray. In such a case there are two trays instead of four. Each battery will have anywhere from 2.1 to 2.16 volts per cell according to the make, and the whole battery, when properly connected up, should show a voltage ranging from ninety to ninety-four. It is not within the range of possibility for anyone to state at present what is the best type or make of battery for use in an electric automobile. There are certain fundamental principles in storage battery construction which cannot be varied. A light weight battery can be made to give a large mileage, but it will have a short life. A heavy battery will usually give a short mileage, but have a long life. The best batteries at present seem to be those which more nearly approach the mean between these two points.

A number of the better makes of electric vehicles have the terminals of each tray or crate of batteries brought back to binding posts at the rear. The connections should be of such lengths that they cannot be incorrectly made. See that the cells have plenty of air while charging, for they generate a considerable amount of gas which might become troublesome if confined. Do not bring a flame where it can explode the gas. The carriage may be run, everything else being in order, as soon as the battery is put in place, charged, and firmly secured by bolts and retaining clamps.

When the battery is received, shipped with the liquid in it, unscrew the small nobs in the top of each cell, and see that the liquid covers the tops of the lead plates. If it does not, it should be filled with electrolyte, but not until the battery can be immediately recharged. Damage is done to the plate if left in contact with the acid for any length of time without being charged.

To make the electrolyte for use in the battery, add one part of chemically pure sulphuric acid to four parts of water. The specific gravity of the electrolyte should approximate 1.25. To determine this without a specific gravity gage, accurately weigh ten pounds of the electrolyte, and exactly the same quantity of water should weigh eight pounds. The weights and measurements should be most carefully made. For refilling the cells where the liquid has evaporated, use a much weaker solution—10 parts of water to 1 part of sulphuric acid.

The lead cell connections should be burned together with lead. When battery connections are soldered, they corrode easily if

not kept painted. Sometimes when running over very rough roads, the connecting lugs may be broken between the cells. If this is the case, the voltage, as shown on the meter, will be unsteady while the vehicle is running on the high speeds, or the current will not flow at all. The vehicle will still operate on the low speeds in most makes of carriages, until such time as the lugs can be burned together, or securely clamped temporarily, which last should be done as soon as the break is discovered.

A charging plug is furnished with every properly equipped vehicle, as is also a volt-ammeter. The positive wire of the plug, usually painted red, should be connected to the positive end of the charging circuit, and the other wire of the plug to the negative. The receptacle for the charging plug and the automatic switch breaker in almost every well made type of electric vehicle will be found close together. Usually the charging plug is so made that it fits the receptacle in but one way. There should be arranged a suitable place for a charging board with a rheostat, and double pole knife switch and suitable terminals for connecting wire. When the plug is properly connected to the rheostat on a switchboard, see that the controller handle is pushed back to rest. Remove your locking key. Push the handle of the charging switch in the carriage over to the proper position, and insert the charging plug. Bring your wall rheostat back to the first contact point, and close the knife switch. After these preparations the circuit is completed by lifting the iron armature of the automatic switch, and if it is held up the circuit is complete, and the battery is receiving a charge. By the rheostat on the charging board, the resistance may be turned out until the flow of current reaches the required number of amperes, registered in the carriage on the ammeter, or better, by one on the charging board.

The battery, no matter of what make, should be charged at as slow a rate as possible. The slower, the greater amount of efficiency given. A battery should never be rapidly charged or discharged.

To learn when the battery is fully charged, consult your meter in the front of the carriage. Another indication of a full charge is that the battery will gas or boil, the sound of which can be plainly heard by placing the ear near the cells.

The automatic circuit breaker now placed in most electric carriages is not to break the circuit when the current is too heavy, but is for the protection of the battery in case the current in the main line should cease or become so low as to allow the batteries to discharge into the

line. So when the flow of current is low, the circuit is broken, and the battery is thereby protected against a short circuit. When the battery is charged, the breaker does not open the circuit; it is not intended for that purpose. An alarm clock attachment which at the hour set will throw the knife switch, and so break the circuit, is the most preferable apparatus to use for such a purpose.

The voltage of a battery remains constant within six or eight volts as long as there is any quantity of charge in it, but drops very rapidly when the charge is nearly exhausted. A battery should never be discharged below seventy volts, and should be recharged at once after every using. The worst neglect you can give a battery is to leave it discharged for any length of time. A little practice in reading the volt-ammeter when the vehicle is running will enable you to tell accurately the amount of charge that remains in your battery. The meter will also inform you whether your motor is running properly, and whether it is using more power than it should.

The counter voltage of the battery, when fully charged and with one-half the normal current flowing into it, should be about one hundred and twenty volts. If it does not reach that voltage before the liquid begins to boil, there may be some bad cells in the lot. A test should be made, and the bad cells should be replaced or repaired. Frequently the cells need nothing but cleaning out.

To clean a cell separate it from the adjoining cells by cutting the lugs. Take the plates out and wash them. Remove all the particles that may have lodged between the plates. The cells should be then filled again with electrolyte, charged, tested, and replaced in the battery.

If not properly set and cared for, the brushes of the motor will give a great deal of trouble, and under such conditions are an extremely prolific source of annoyance. The brush holder clamps the carbon firmly, and makes a solid connection for the passage of the current. The set screws should be firmly pressed against the carbon and securely locked by the lock nuts. Care should be taken that the brass of the carbon holder does not touch the commutator. When properly set the brushes make perfect contact, and keep the commutator smooth and in good condition. Should it become otherwise, for any reason whatsoever, it should be attended to immediately.

*( To be continued. )*

## Steam versus Horse Drawn Trucks

HENRI G. CHATAIN

**I**F the steam truck is to become a factor in the transportation of general merchandise through our city streets and best suburban roads the total cost per ton mile of goods transported must be less than the present system of horse transportation, otherwise no matter how many sterling qualities and advantages may be advanced for their adoption, the intending purchaser will balk if you ask him to increase his expense account. I bring up the question of cost per ton mile of paying load first, because in an economical and broad sense it includes nearly all the features of the steam truck except such points as noise, odor, visible exhaust, and products of combustion. If a steam truck does the work that it is designed to do, and does it week in and week out, and so on throughout its life (which should only be limited by fashion) and the cost per ton mile of paying load remain a fairly constant figure it may be said it fulfils its duty, therefore it is well designed.

To successfully accomplish this result all its parts must be so designed as to be free from breakdowns, adhesion of the wheels to the ground must be sufficient at all times (and this is a very important feature), steam must be available at all times and in large enough quantities for emergencies ; provision must be made to greatly increase the effort transmitted to the drivers to get out of ruts, holes, and start on rough pavements, etc.

Now, as to the non-paying side but that which carries weight with the general public, the noise, odor or visible exhaust, these it can be said are reasonably dispensed with by the best makes. The question could now be asked are there any steam trucks that fulfil these general requirements? I think it can be answered for the greater part in the affirmative, and probably the most successful steam trucks built in this country which fulfil these requirements were constructed by the following firms : The Cunningham Engineering Company, of Boston, now being merged into the Massachusetts Steam Wagon Company ; the Thornycroft Steam Wagon Company of America, and the Adams Express Company truck. The first of these is an entirely American product. The second has imported from England certain parts of their first wagon which was built in this country, while the third represents

a design worked out by the mechanical engineer of the said company for experimental purposes. These three trucks represent about the best that has been done in this country up to the present, and a general description of two of the three systems follows :

The Massachusetts Steam Wagon Company's truck shown in the illustration carries three and a half tons burden at the rate of five miles an hour through fairly crowded streets, and unloaded it may safely be worked at higher speed under the same conditions. The wheels are made up of metal hubs, wood spokes and rims, and their diameter is uniform, viz.: 34 inches. The tires are of steel and are bolted to



Massachusetts Steam Wagon Company's Truck—Load Three and a half Tons

the rims ; their width is approximately  $3\frac{3}{4}$  inches and they are 1 inch thick. The axles are machine steel,  $2\frac{1}{2}$  inches diameter at bearing surfaces and tapered toward the center, diameter at that point being approximately  $3\frac{1}{2}$  inches. The axle bearings are of the "cage roller" type. Their lengths are  $5\frac{1}{2}$  inches. A phosphor bronze washer, which is used for a thrust bearing, is retained by one of cast iron, and a nut. All four springs are of the semi-elliptic type, held rigidly at their front ends, but movable at the rear ends to allow for compression ; heavy castings hold the spring to a steel chan-

nel, which is part of the frame steering. This is effected by the fifth wheel method and is actuated by means of a series of spur gearing and a worm, a hand wheel which is placed in the cab within easy reach of the operator. The worm, of course, makes the system irreversible from shocks, etc. The frame is built of standard roll sections and comprises three main members, running the length of the frame, suitably braced to make it rigid. The platform proper is of wood; no "reach" or "reach rods" are used in this construction. The engine is horizontal and erected upon a built-up base, which is rigidly fastened to the central member of the frame by means of a web plate. It consists of a pair of  $3\frac{1}{2} \times 6 \times 5$  inch cylinders of the locomotive type; 180 degree cranks for each separate engine, making four 90 degree cranks all told. Means are provided by a special valve to admit steam to all cylinders, by which arrangement 50 horse-power can be developed for a short period of time. The different parts are lubricated by means of grease retained in special cups. Sliding doors on the engine case permit inspection. The throttle valve, variable cut-off, the reverse motion, and the "transformer" valve are all operated from the cab and are very accessible. The power is transmitted from the engine shaft by a spur gearing to two countershafts carrying two "Cunningham" hydraulic clutches, one forward and the other back of the engine shaft, all lying in the same plane. Keyed to the countershafts are the sprocket wheels, by which by the intermediary of chains and pinion, power is transmitted to the differentials on both front and rear axles. These chains are kept taut by means of stretcher-rods and due to the springs in their construction shocks on the engine are avoided.

The front differential has in combination with it a specially devised gimbal joint which permits of the axle being turned without interfering with the transmission of power to it. The front set of wheels may be used alone to run by, or the rear set, or both, or the engine may run free. All this is controlled by two small valves in the cab, and within handy reach of the driver.

Two yoke-shaped castings with friction surfaces, partially lined with wood, comprise the brake. These surround and act on the outside surfaces or shells of the hydraulic clutches, and are actuated by means of two small shafts (one at each end of the brake yokes) carrying opposed eccentrics. The shaft near the front has a lever arm, and by the use of a bell crank and several links, this is connected to a brake-operating lever in the cab. The boiler is of the upright fire-tube type,

and is fired as any ordinary boiler from the front ; it is placed to the rear of the operator, and in such a position that its weight is directly over the front driving wheels. Coke or stove coal may be used for fuel, and the necessary draft and regulation of the fire is obtained by the forced draft method, air being supplied by a small fan blower, and driven by a small vertical engine. The amount of air is regulated by the speed of the engine. The heating surface is 125 square feet, and the grate surface 3 square feet.

An independent pump supplies water to the boiler, and an injector is also used as an auxiliary feed. The working pressure is 175 pounds per square inch, and the safety valve is set at 200 pounds to the square inch. The exhaust steam passes into a feed water heater which also acts as a muffler, thence into the stack and passes off in an invisible state. The water tank is situated at the rear under the frame, and will hold approximately 900 pounds of water ; the fuel bunker will hold about 300 pounds. The general dimensions of the truck are as follows : 17 feet long over all ; 5 feet 6 inches extreme width ; wheel base is 9 feet 8 inches, and the gage 4 feet 6 inches (center to center of tires) ; the platform is 12 feet long by 5 feet 6 inches wide, giving 66 square feet of available platform area ; the height of the platform is 3 feet 7 inches from the ground.

The Thornycroft Steam Wagon Company of America's truck was described quite fully in our last number, and it is scarcely necessary to go into details regarding it here.

The Adams Express Company truck carries  $3\frac{1}{2}$  tons, at 5 miles per hour. The wheels are built up of metal hubs, wood spokes and rims, and all four are of "dished" construction. The front ones, or the steering wheels, are 36 inches in diameter, and the rear or driving ones, are 48 inches in diameter. The tires are of steel, and bolted to the rims ; those at the front wheels being  $3\frac{1}{2}$  inches wide, and those of the drivers, 6 inches wide.

The rear axle is in one piece, and stationary, the wheels rotating upon it. It is bent downwards at the end so as to bring the spokes of the wheels which are in compression perpendicular to the road surface. The front one is straight and in three parts (pivot steering) ; the parts outside the pivot support being inclined downward to accomplish the same result in regard to the wheels, as with the rear ones. Plain sleeve bearings are used for the driving wheel (the hubs being of gun metal) ; the width of the bearing is  $7\frac{1}{2}$  inches, and the axle at this point is  $2\frac{1}{2}$  inches diameter. The front wheels have the same type bearings, ex-

cept a little smaller,  $6\frac{1}{2}$  inches being their width, and  $2\frac{1}{2}$  inches the diameter of the axle. All of the springs are of the semi-elliptic type, and are fastened rigidly to the axles, but are free to move at both ends where they are connected to the frame. The steering is effected by means of the pivot-support system of the rear trapezium variety, and is actuated by a hand wheel from the operator's seat through a system of spur-gears and rack on the rod connecting the two steering arms. The shaft carrying the hand wheel is placed perpendicular to the ground. The frame is built up of wood, partially covered with steel plates, on



Adams Express Company's Truck—Load Three and a half Tons

the top of which is placed a wood platform. Two "reach" members are used made of steel tubing with a flexible joint, and suspended to the frame at their centers, but the whole connects the front and rear axles rigidly together. The engine is horizontal, and is connected rigidly to the frame, and is of the compound with two cylinders  $4 \times 8 \times 6$  inches, being entirely encased. The throttle valve, the variable cut-off and reverse motion, like the Massachusetts and Thornycroft wagons, are within easy reach of the operator from his seat. The engine shaft is extended through the intermediary of a universal joint.

This extension runs in two bearings fastened to the frame, and carries two spur-gears of different diameters, either of which may be slipped along the shaft and made to engage with either of two spur-gears on a first countershaft, which carries in all, three spur-gears. The first countershaft is supported by three bearings, and is in one piece; the smallest gear on this shaft meshes with a gear on the exterior of the differential, which is carried on a second countershaft; this is supported by four bearings, and carries pinions at its extremities which mesh with the internal gear rigidly fastened as near to the periphery of the driving wheels as is practical. Two universal joints are used in the make-up of this secondary countershaft to permit of some flexibility, and to allow the extremities to incline downward at the same angle as the ends of the fixed axle. The boiler is a combination water tube and shell with special provisions for obtaining dry steam and heating the exhaust; it is fired centrally from the top, is located directly over the front axle, and extends through the floor of the frame, so that the ash pan and grate are below the floor; fire is regulated by means of a damper in the stack; coke or stove coal may be used for fuel. The heating surface is about 100 square feet, and the grate area, 6.76 square feet. The main feed is from a direct connected pump, but an auxiliary feed pump is provided. The working pressure is approximately 140 pounds to the square inch, and the safety valve is set at 200 pounds per square inch. The water tanks have a capacity of about 1,600 pounds. The general dimensions are as follows: total length over all, 17 feet; width over all, 7 feet 4 inches; the wheel base is 8 feet 6 inches, and the gage 5 feet 6 inches (center to center of tire); the platform is 11 feet long by 5 feet wide, giving 55 square feet of available platform area for load; the height of the platform is approximately 3 feet 11 inches from the ground.

The carrying capacity of these three steam trucks is about the same; otherwise their general construction and principles vary greatly. It would be out of the sphere of this article to enter into a discussion or criticise the various parts or details of the different constructions, and that will be left for future articles especially devoted to that side of the subject. No total weights of the trucks have been given, as this is a point which is rather difficult to get at without a scale to verify the weights given by those interested. Weights of motor vehicles, by the way, is a very much discussed subject, and without specifically going into the discussion, I should like to say that, if it is necessary to make parts heavy to be consistent with durability and long life, they should un-

doubtedly be made so, considering that our actual operating expenses are very small as compared to the fixed charges; therefore, it would certainly be more economical to increase that slightly than to greatly increase the depreciation account by having a truck which had been shaved down so as to make it light, even though it were inconsistent with good design. No statement has been made in regard to hill climbing, for this, as with the case of dead weights, it is very difficult to get at comparable facts. Such and such a statement is made that a truck will climb a certain per cent. grade with so and so many tons, but rarely any mention is made, however, regarding conditions of road surface or rate of speed at which it was accomplished. The writer is convinced, however, from personal observations and numerous trials that, under fair conditions of road surface, ordinary grades, such as are traversed by horse-drawn trucks, the steam truck will work and at a higher rate of speed than the horse. The average comparative costs of operation that are given in the following tables are derived from various sources, including trials conducted by the writer, and from the manufacturers themselves:

TABLE.	Distance traversed per day of ten working hours.	
	LADEN.	UNLADEN.
A	35 miles	Nil.
B	50 "	"
C	25 "	25 miles

(A) and (B) are intended to correspond with what should be realized in a service between points where a full load can be provided in both directions, while (C) is probably the worst average of the light load contingency that would be likely to occur:

TABLE A.

Prime cost, \$3,000 . . . . .	
Interest at 5 per cent. per annum . . . . .	150 00
Depreciation at 15 per cent. per annum . . . . .	450 00
Fuel—15 pounds coal per vehicle mile . . . . .	
$15 \times 35 \times 300 \text{ days} = 70.3 \text{ tons}$ . . . . .	
2,240	
Coal at \$4.50 per ton . . . . .	316 35
For lighting fire and raising steam . . . . .	25 00
Water—11 gallons per vehicle mile, $11 \times 35 \times 300 = 115,500$ gallons	
@ 15 cents per 1,000 gallons . . . . .	17 33
Repairs, material and labor . . . . .	300 00
Wages of driver . . . . .	600 00
Oil, waste, etc . . . . .	40 00
Insurance . . . . .	54 00
Total per annum . . . . .	\$1,952 68

## STEAM VERSUS HORSE DRAWN TRUCKS

Thirty-five miles per day  $\times 3\frac{1}{2}$  tons  $\times 300$  days = 36,750 net ton miles per annum.

$$\frac{1,952.68}{36,750} = 5.31 \text{ cents per net ton mile.}$$

TABLE B.

Prime cost, \$3,000 . . . . .	
Interest at 5 per cent. per annum . . . . .	\$150 00
Depreciation at 15 per cent. per annum . . . . .	450 00
Fuel—15 pounds coal per vehicle mile . . . . .	
$15 \times 50 \times 300 = 100.4$ tons . . . . .	
2,240	
Coal at \$4.50 per ton . . . . .	451 80
For lighting fire and raising steam . . . . .	25 00
Water—11 gallons per vehicle mile, $11 \times 50 \times 300 = 165,000$ @ 15	
cents per 1,000 gallons . . . . .	24 75
Repairs, material and labor . . . . .	300 00
Wages of driver . . . . .	600 00
Oil, waste, etc. . . . .	40 00
Insurance . . . . .	54 00
Total per annum . . . . .	\$2,095 55

Fifty miles per day  $\times 3\frac{1}{2}$  tons  $\times 300$  = 52,500 net ton miles per annum.

$$\frac{2,095.55}{52,500} = 3.99 \text{ cents per net ton mile.}$$

TABLE C.

Prime cost, \$3,000 . . . . .	
Interest at 5 per cent. per annum . . . . .	\$150 00
Depreciation at 15 per cent. per annum . . . . .	450 00
Fuel—15 pounds coal per vehicle mile . . . . .	
$15 \times 25 \times 300 = 50.2$ tons . . . . .	
2,240	
Coal at \$4.50 per ton . . . . .	225 90
Two-thirds of this consumption for running unladen . . . . .	150 60
For lighting fire and raising steam . . . . .	25 00
Water—11 gallons per vehicle mile, $11 \times 25 \times 300 = 82,500$ , @ 15	
cents per 1,000 gallons . . . . .	12 38
Two-thirds of this consumption for running unladen . . . . .	8 25
Repairs, material and labor . . . . .	300 00
Wages of driver . . . . .	600 00
Oil, waste, etc. . . . .	40 00
Insurance . . . . .	54 00
Total cost per annum . . . . .	\$2,016 13

Twenty-five miles per day  $\times 3\frac{1}{2}$  tons  $\times 300$  = 26,250 net ton miles per annum.

$$\frac{2,016.13}{26,250} = 7.68 \text{ cents per net ton mile.}$$

In conclusion it can be said that a two-horse truck will accomplish approximately 12,000 net ton miles per annum, at an average cost of 13 cents per net ton mile. A four-horse truck will accomplish 20,000 net ton miles per annum, at an average cost of 12 cents per net ton

mile. Comparing these average results with the figures in tables A, B and C the unquestionable advantage in point of economy of the steam truck is obvious.

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Boston's newest automobile club, the Automobile Club of New England, had its organization meeting on the evening of December 19, at the Hotel Somerset. Mr. Arthur W. Stedman, a well-known merchant and one of the leading members of the Brookline County Club, was chosen president; Mr. Francis R. Hart, of the Old Colony Trust Company, a Milton man, vice-president; Mr. George E. McQuesten, a lumber dealer, of Brookline, secretary; Mr. Royal R. Sheldon, well known in trotting-horse circles as well as in business life, of Boston, treasurer. The management of the club is vested practically in an Executive Committee to consist of these officers and eight members elected at large every year. This committee will choose a Race Committee of five, which in turn, will have full charge of all race meets; even to the fixing of dates. The annual dues of the new club are to be \$50, with \$50 for the entrance fee. The club has taken the land and buildings of the old Suburban Club, just across Clyde Street from the Country Club, in Brookline, for its home, and the site and buildings are ideal for its needs. It will be one of the very highest types of gentlemen's clubs.

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A great deal of talk is heard about the probable reduction in price of automobiles during the coming season. People are heard to make such remarks as "Oh, they will soon come down in price, just like the bicycle." They may come down in price, but it does seem that the reduction will not be nearly so rapid or as great as in the case of the wheel. The final automobile has not yet been produced; manufacturers are finding out, month after month, that marked changes are necessary in order to bring the horseless vehicle to its greatest perfection. Many makers have decided to increase the price of 1901 models, rather than to bring down their price, and there is every indication, that while the reduction will eventually come, it will come slowly.

## The Strength of Wheels

The first consideration in automobile construction should be strength of frame and running gear, as this is of even greater importance than the motive power. If this is weak and breaks down, or if it is of insufficient power, your machine stops, and though it is very annoying it is not often dangerous. But if the frame or wheels give out it is a serious question, the damage to the occupants depending on the speed at the time of the accident and the condition of the road.

The frame usually receives the most attention and rarely gives way, even with severe straining on different kinds of roads, but the wheels seem to be overlooked in some cases. While they are probably designed to be strong enough for all direct strains brought on them, they should be able to stand such side strains as they are liable to meet with. Any carriage is liable to slew a little at times, especially on a smooth road, and hubs should be long enough and spokes strong enough to stand as much of this as is apt to occur in ordinary running. Although the rear wheels carry the most weight and are usually stronger, the crippling of a front wheel is generally more disastrous to the occupants of the carriage. The front wheels, too, have to be steered out of ruts and car tracks, which imposes a side or twisting strain on them and their strength should be closely looked after.

This may mean added weight, and a wheel that is not quite as neat in appearance, but the question of safety should be uppermost in the mind of both designer and purchaser. A few pounds of weight here is often an improvement in many ways, and the extra work on the motor is not worth considering, while the looks are of minor importance. Whether you prefer wire or wooden wheels, be sure they are strong enough for the service required.

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The race inaugurated by the *New York World* intended to welcome the end of the old and dawn of the new century was won by J. M. Paige, who operated a Locomobile, his running time between the Harlem office of the *World* and the main office being 38 minutes 21 seconds.

## About Good Roads

THE more general introduction of the automobile for cross-country runs will perhaps do more to solve the problem of good roads than anything else. The automobile requires a smooth road for its successful operation, and this being so it is only a question of whether that kind of a road will be supplied or not, and we cannot but think that it will.

Perhaps the greatest opponent the automobilist has is the farmer, and it is quite difficult to convince the average farmer of the great saving good roads would result in to his horses and wagons, to say nothing of the much neater appearance of his adjacent land. The mechanism of certain makes of automobiles are more likely to be affected by jolting on poor roads than others, and such service cannot but be hurtful, in some degree, at least, to automobiles of any construction.

It is again probable that could automobile manufacturers know positively that good roads were generally to be encountered they might be induced to make a lighter construction and so reduce the weight which it is now necessary to have in order to meet the more severe strain caused by bad roads.

It is reasonable to expect that the efforts for good roads which are being made by the various automobile clubs throughout the country will result in a general stirring up of this important question and a better condition of things along these lines. This question does not appeal to owners of automobiles who confine their operations to the limits of our big cities where smooth asphalt roads are general, but it is our belief that the automobile will become more and more popular as conveyances from one city or town to another, and will, in this respect, catch a portion of the traffic now obtained by the trolley.

Automobiles are somewhat different from the bicycle when it comes to country roads. The latter can get along if a narrow strip a few inches wide is reasonably good. The automobile, however, must confine itself to the roadway, taking the bumps and jars and stretches of sand as they come. The operator cannot get off and lead his machine around a bad strip, either, as can a wheelman. The popularity of the bicycle has done much for good roads, and the automobile should do more.

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A good solution for uniting two pieces of India rubber can be made by dissolving ten parts of finely shredded India rubber in bisulphide of carbon, add to this one and one-half parts rosin, and one part of shellac.

## The Automobile Index

*Everything of permanent value published in the technical press of the world devoted to any branch of automobile industry will be found indexed in this department. Whenever it is possible a descriptive summary indicating the character and purpose of the leading articles of current automobile literature will be given, with the titles and dates of the publications.*

Illustrated articles are designated by an asterisk (\*).

- \*Air Motor Vehicle, The Tripler—**  
Hugh Dolnar. (See under Liquid.)
- Alcohol, The Utilization of—**  
Leon Massion. This article is in French, and goes into the merit of alcohol in its application to the operation of automobiles. "L'Avenir de L'Automobile," Paris, November, 1900.
- \*Autocar, Its Use and Management, The—**  
Henry Sturmey continues his interesting articles on this subject. "The Autocar," London, December 15, 1900.
- Automobile, The—**  
Harold H. Eames. An article devoted to the past and possible future of the automobile industry. "Electrical World and Engineer," January 5, 1901.
- \*Automobile, The Darracq—**  
This is a most interesting sample of recent motor vehicle construction. "La Locomotion Automobile," Paris, November 29, 1900.
- \*Battery, The International Storage—**  
(See under Storage.)
- Bicycles, Motor—**  
An address delivered by Mr. Joseph Pennell before the Automobile Club of Great Britain, in which he relates his experience on a trip he made to Switzerland. "Motor Car Journal," London, December 15, 1900.
- Brakes—**  
P. M. Heldt. An article in which the author goes into the construction problems connected with the making of automobile brakes. "Horseless Age," New York, December 12, 1900.
- \*Break, The Daimler—**  
Description of a three-seated break suitable for public service. "La Locomotion Automobile," Paris, December 13, 1900.
- \*Business, Motor Vehicles in—**  
W. H. Maxwell, Jr. Deals with the early developments of the automobile, as applied to purposes of business. "Automobile Magazine," January, 1901.
- \*Delivery Equipment of a Large New York Store, The. Max Lowenthal—**  
The author goes into the practicability of the electric automobile for light delivery service. "Electrical World and Engineer," New York, December 29, 1900.
- Design and Construction, Gasoline Automobile—**  
Jas. F. Hobart. (See under Gasoline.)
- \*Electric Automobile, Gasnier—**  
Description of a complete outfit for electric vehicles. There are two armature windings and two collectors. "L'Industries Electrique," Paris, October 10, 1900.
- \*Electricity for Motorists—**  
Chapter 2 of a series of articles by J. W. Roebuck, in which he gives a résumé of the elementary principles of electricity. The articles are interestingly written, and ought to be of value to automobilists generally. "Motor Car World," London, December, 1900.
- Engines, Lubrication of Internal Heat—**  
Hugo D. Meier. (See under Lubrication.)
- \*Fete at Paris—**  
Article showing a number of the more interesting vehicles which took part in the recent floral fete at Paris. "L'Avenir de L'Automobile," Paris, November, 1900.
- France, Heavy Motor Traffic in—**  
Opening address of the Fifth Session of the Liverpool Self-Propelled

- Traffic Association, December 3, 1900, by M. Georges Forestier. "The Autocar," London, December 8, 1900.
- \*Garments for Fair Automobilists—**  
By Chaffeuse. Articles in which are described various costumes suitable for ladies while out automobil- ing. "The Autocar," London, December 8, 1900.
- \*Gas Engines, Compounding of—**  
Part 2 of an article by C. P. Malcolm, in which he points out several advantages obtained as a result of compounding. "Horseless Age," New York, December 26, 1900.
- \*Gasoline Automobile Design and Construction—**  
Jas. F. Hobart. An article in which the author undertakes to point out the mistakes made by the gasoline vehicle designers, and offers sugges- tions whereby the gasoline motor may be made more satisfactory. "Age of Steel," St Louis, January, 1901. (See under Design.)
- \*Gearing—**  
E. C. Oliver, M. E. Part 1 of an article in which the author goes into fundamental principles relating to gearing. "The Horseless Age," New York, December 19, 1900.
- Holland, Automobilism in—**  
G. A. Von Hunteln. An article in which the author goes into the status of the horseless vehicle in Holland. "The Horseless Age," New York, December 19, 1900.
- \*House, An Automobile—**  
F. C. Hudson. Article giving plans and elevation of a house suitable for storing an automobile. "Automobile Magazine," New York, January, 1901.
- \*Liquid Air Automobile, The—**  
A letter penned by Hugh Dolnar, in which he criticises some of the wild statements by the manufactur- ers and propagators of this particular vehicle. "The Autocar," London, December 15, 1900.
- Lubrication of Internal Heat Engines, Piston—**  
Hugh D. Meier. An article in which the author discusses the merits of various lubricating systems. "Horse- less Age," New York, December 26, 1900.
- \*Motor Car Industry, A Short Review of the—**  
C. H. E. Rush and Basil Joy. "Coach Builder's and Wheel- wright's Art Journal," London, No- vember, 1900.
- \*Mors Motor Vehicle—**  
Description of a five horse-power vehicle which is very popular, and which in recent tests has given an ex- cellent account of itself. "The Auto- car," London, December 8, 1900.
- \*Motor Vehicle, The Schandel—**  
Description of a vehicle which represents a sample of recent French practice. "Horseless Age," New York, December 19, 1900.
- Pavements, Automobiles and City—**  
Geo. E. Walsh. The author goes into the relative merits of different forms of pavements. "Electrical Review," New York, December 26, 1900.
- Power, The Driving—**  
E. J. Stoddard. Continuation of an article in which is given a num- ber of formulæ for finding the power of various working parts of an auto- mobile engine. "Horseless Age," New York, December 12, 1900.
- \*Road Building in United States, Prog- ress of—**  
Part 3 of a series of articles by Maurice O. Eldridge, devoted to a history of the development of good roads in this country. "L. A. W. Magazine," Cleveland, December, 1900.
- Road Traction—**  
Paper read before the Society of Arts on December 5, 1900, by Prof. Hele-Shaw, L. L. D., F. R. S. "The Autocar," London, December 8, 1900.
- \*Run, The 1,000 Miles Non-Stop, Abso- lute—**  
Description of a run which took place at the Crystal Palace. "The Autocar," London, December 1, 1900.
- \*Show at Crystal Palace, National—**  
Article devoted to the show which was recently held in London. "Motor Car Journal," London, December 1, 1900.

**\*Steering Wheel, A New—**

In this wheel a receptacle is provided for gloves, glasses, maps, etc. "The Autocar," London, December 22, 1900.

**\*Storage Battery, The International—**

Description of a battery, in which it is claimed that, owing to a peculiarity in construction, it is lighter, has a lower first cost, and is more durable, and less danger of disintegration caused by jolting. "Electrical World and Engineer," New York, December 22, 1900. (See under Battery.)

**\*Tell-Tale, A Circulation—**

Description of a small device designed to show at a glance whether the water used for cooling is circulating properly. It may be introduced into the circulating system between the engine and pump. It is made by the London Autocar Company. "The Autocar," London, December 15, 1900.

**Tests of Automobiles—**

Kallmann. The author gives an account of the tests of electric automobiles which were carried out in the spring of 1900 at Berlin.

**\*Tour from John O. Groats to Lands End—**

Short description of a run made by Hon. Mr. Egerton. "Motor Car Journal," London, December 29, 1900.

**\*Touring by Automobile, Long Distance—**

W. H. Stemmerman, M. D. An interesting account of what took place on a tour covering over 600 miles. The article is written in a most interesting manner. "Automobile Magazine," January, 1901.

**Traction, Road—**

Paper read before the Society of Arts on December 5, 1900, by Prof. Hele-Shaw, L. L. D., F. R. S. "The Autocar," London, December 8, 1900.

**Traffic in France, Heavy Motor—**

Opening address of the Fifth Session of the Liverpool Self-Propelled Traffic Association, December 3, 1900, by M. Georges Forestier. "The Autocar," London, December 8, 1900.

**\*Transmission Device, A New—**

A. H. Chadbourne. Description of a new device which possesses a number of new features. "Automobile Magazine," New York, January, 1901.

**Tricycles, Some Defects and Remedies, Motor—**

A. E. S. Craig. "Motor Car World," London, December 1, 1900.

**\*Vehicle, The Turrell Light—**

Description of a new type of motor vehicle. Article presents working drawings of parts. "The Autocar," London, December 15, 1900.

**\*Voiturette, The Bertrand—**

Description of a new vehicle which has extremely graceful lines. "L'Avenir de L'Automobile," Paris, November, 1900.

**\*Voiturette, The Knowles-Chair—**

Description of a machine in which the Panhard system of transmission is used. "The Motor Car Journal," London, December 8, 1900.

**\*Voiturette, The Legrand—**

Description of a new type of French carriage which has given much satisfaction. A de Dion Bouton motor of three horse power is used. "La Locomotion Automobile," Paris, December 13, 1900.

**\*Voiturette, The Marc Gardon—**

Description of a new style of French carriage. "The Autocar," London, December 22, 1900.

**\*Voiturette, The Petit—**

Article giving illustrative description of a carriage of this name. A striking feature is low seating of the vehicle. Detailed drawings are also given. "La Locomotion Automobile," Paris, December 20, 1900.

**\*Wagon, The Postel-Vinay Electric—**

Description of a wagon possessing some highly interesting points, and calculated to carry loads of 10 tons. "Automotor Journal," London, December, 1900.

**Water for Automobile Boilers—**

E. J. Stoddard. Discussion of some effects produced by the use of water containing various substances. The article is quite interesting and ought to be read by every user of steam vehicles. "Horseless Age," New York, December 26, 1900.